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Japan Report

ELECTRONICS INDUSTRY FORECAST FOR 1982

(FOUO 48/82)

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SCIENCE AND TECHNOLOGY

ELECTRONICS INDUSTRY BUSINESS FORECAST FOR FY 82

Balanced, Orderly Growth

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 261-263

[Article by Shoso Watanabe, Assistant Editor: "Toward Orderly Growth, With Balance Between Domestic and Foreign Demand"]

[Text] Growth in Private-Use Sector Will Stagnate, but Industrial-Use Sector and Parts Will Undergo Double-Digit Growth

Abstract: The FY 81 performance of Japan's electronics industry showed double-digit growth as the three sectors of private use, industrial use, and parts combined for a total of over 10 trillion yen. Although electronics for private use slowed on the domestic market, exports centered on VTR were responsible for large growth. Electronics equipment for industrial use has seen domestic demand account for the major share, as has been the case in the past, but the computer export-import situation has seen a turn in which exports have outrun imports, and the entire product area has become export-oriented. As a result, Japan's electronics industry has seen its overall export ratio exceed 50 percent, and its status as an export industry has been strengthened considerably. The continuing recession in the United States and Europe in FY 82 and the slow increase in consumption are expected to cause the private-use sector to suffer low growth. A proportionate decrease in the growth of electronics parts for this sector may also be expected. On the other hand, both domestic and foreign demand for products in the industrial sector is brisk, and growth paralleling that of the previous year can be anticipated. The consequences of the trade friction with the Western world are becoming more acute, but it seems possible that this trend will see the brakes applied during FY 82, and Japanese products may enter U.S. and European markets more smoothly.

As has been its custom in previous years, NIKKEI ELECTRONICS sent out questionnaires to 96 electronics equipment and parts manufacturers in 193 areas

and by the end of February had received answers from 86 companies and 193 areas. This data, together with material obtained by the cooperative efforts of the industrial survey department of the Nippon Kyogo Bank, sections 1 and 2 of the NIHON KEIZAI editorial staff, and NIKKEI BUSINESS, were used to compile this forecast of the Japanese electronics industry for 1982.

Better Than 10-Percent Growth Overall; Total Production of 12 Trillion Yen

According to the grand total table (Table 1) compiled from these questionnaires, the total production of Japan's electronics industry in FY 82 is expected to show a growth of 10.8 percent over the previous year and come up to 12 trillion yen. This will represent double-digit growth over a 4-year period, but the items responsible for this year's growth seem somewhat different from those of the past.

VTR Ends Sharp Initial-Stage Growth Period

Looking first at electronics equipment for the private sector, FY 81 saw moderate growth, as expected, in the area of color television tape recorders, which, together with the expansion in VTR's over the previous fiscal year, resulted in an overall growth of 18 percent. Video discs and sound equipment did not perform as had been expected. In the particular area of sound equipment, the mainstream system components began to suffer during the latter half of the year, and for the total year they declined to below the previous year's rate.

It is expected that moderate growth in color television and tape recorders will continue in FY 82 as before. On the other hand, sound equipment will be faced not only with the worldwide lack of increase in individual spending power but also with the consumers' reluctance to make purchases, what with the advent of DAD [digital audio disc] in the United States, Europe, and Japan, as well as the changes in interest on the part of young people; thus there seems to be little chance of recovery at least during the first half of the year. Even assuming that DAD, which all companies expect to market starting this fall, becomes a paying item, it does not seem possible that this market area will register a plus.

Such being the case, FY 82 will again see VTR's serving as the prime force to pull the private-sector electronics industry through. On the other hand, VTR production in FY 81 exceeded 10 million units, and it will be difficult to maintain a doubling pace, as has been the case during the past few years. Japanese manufacturers export 80 percent of their total production and are supplying 95 percent of the world's demands, but no great increase in the American market can be expected in FY 82, while domestic demand is expected to stall at about 2 million units. As a result, electronics equipment for the private sector is expected to be at a low level of about 6.9 percent, and total production is expected to be 4.15 trillion yen. Its fraction of the total market will represent a 1.3-point drop to 34.3 percent.

Industrial-Use Electronics Expected To See Double-Digit Growth Overall

Production of electronics for industrial use is expected to be good overall in FY 82. It is estimated that computers and related equipment increased 18 percent over the previous year in FY 81, but this is expected to increase another 18 percent or better in FY 82, and sales will close in on 2 trillion yen.

At the present time, there seems to be nothing in the computer area that might serve as a brake on growth. It has been reported that the new general-use large computers which the various companies announced in FY 80 and 81 are "receiving far more orders than expected," and their production will go on-stream in FY 82. OA-related equipment such as personal computers and Japanese-language word processors are expected to see their growth period approaching, and they are expected to double or triple their growth in FY 82. Exports exceeded imports for the first time in FY 81, and this margin is expected to increase in FY 82; total exports of all domestic industries are expected to double.

Because construction investment by the Telegraph and Telephone Public Corporation for FY 82 is less than the previous year's expenditures, there will be a decrease in demand in the government and public sector insofar as communications equipment is concerned. On the other hand, domestic private demand and exports will increase, and the overall picture is expected to show roughly a 10-percent increase over the previous year. The demand on the part of the Telegraph and Telephone Public Corporation has been suffering ever since the lifting of the domestic telephone stockpiling program, but INS (high-level information communication system) development for FY 82 will be budgeted at 240 billion yen and will finally get off the ground. There are bold plans to convert the entire country to digital exchanges and optical transmission system within this century, and if this INS-related construction materializes, there is ample possibility that the Telegraph and Telephone Public Corporation's needs will become sizable after FY 83.

Electric measurement equipment is also expected to show double-digit growth in FY 82. Sustained by private industry's demands for facility renovation and by increased exports, industrial equipment is predicted to expand 14 percent over the previous year. In the measurement equipment area, the investment in VTR facilities is expected to hurt expansion in ordinary measurement equipment, but there will be expansion in measurement equipment for semiconductor-related and optic-related areas. On the other hand, chances are dim for a big recovery in electronics equipment for medical use in FY 82. The net effect is expected to be an increase of 13.2 percent over the previous year in electronics equipment for the industrial sector, for a total of 4.14 trillion yen. This sector will account for 34.2 percent of all electronics sales, which will be up 0.7 percent from the preceding year.

Growth of Electronics Equipment Parts in Private Sector To Languish

The scale or growth in production of electronics parts in FY 82 is expected to expand 12.7 percent over the previous year to 3.8 trillion yen. Its share

of the total electronics market will be 34.2 percent, up 0.6 percent from last year.

Electronics parts expanded over the entire front during FY 81, to 20 percent over the preceding year, for a total of 3.37 trillion yen. The main factors responsible for this large increase were increased production in VTR and OA-related equipment and the increased demand for parts in multicomponent areas. The growth rate in VTR is expected to decrease in FY 82, while the inactivity in sound equipment is expected to continue for a while, with the result that growth in demand for general private-use electronic parts will probably suffer. On the other hand, the area of general parts for electronics equipment for industrial use is expected to maintain its high rate of growth even after FY 82. In the overall area of parts, the trend to "lighter, thinner, shorter, and smaller" is taking over, together with improved performance and high densification.

In the semiconductor area, there was sharp growth in the VTR area in FY 81, in which the growth in individual semiconductor elements exceeded that of IC [integrated circuits]--something that had not been seen for a long time--but this area is expected to witness a turnaround in FY 82. On the other hand, there will probably be no sharp increase in IC exports. The sharp increase in the American market share taken up by Japan-made IC memory and the depressed business of the principal American semiconductor manufacturers have increased the objections of the American side to Japanese IC, and this is not an atmosphere in which domestic manufacturers can be pushing unilateral exports.

Effort To Expand Domestic Demand Is Important Subject

Japan's electronics industry not only has exceeded 10 trillion yen in production but also has upped its export ratio to over 50 percent. This amounts to shipping more than 50 percent of domestic production overseas. Japan's electronics industry has already been in this situation for some time, and it has come to the point where domestic factors will not determine the rise or fall of this industry. The increasing trade-friction problem besetting Japanese products has switched from a one-industry or one-product type to an entirely different dimension. If the electronics industry is to look for more growth in the future, it must somehow promote domestic demand in line with increased exports.

To be sure, there are only a few areas in which the electronics industry can by itself cause an expansion in domestic demand. On the other hand, there may be a number of pathways by which a large project can be used as lever to increase domestic demand, just as with INS. A balanced growth between domestic demand and exports may be the situation that Japan's electronics industry should be looking to in the future.

Table 1. Prospects for the Japanese Electronics Industry in FY 82
(Unit: 1 Million Yen)

6 民生用電子機器(合計)	3,292,909 (35.1%)	3,882,500 (35.6%)	4,152,100 (34.3%)	117.9	106.9
7 (電子レンジを除く合計)	3,153,465	3,736,100	3,991,600	118.4	106.8
8 産業用電子機器(合計)	3,265,350 (34.9%)	3,656,200 (33.5%)	4,139,300 (34.2%)	112.0	113.2
9 (電卓を除く合計)	3,062,273	3,493,100	3,963,300	114.1	113.5
10 コンピュータおよび関連装置	1,360,421	1,612,400	1,897,700	118.5	117.7
11 電子応用装置	201,917	213,100	231,400	105.5	108.6
12 医用電子装置	127,233	133,000	140,000	104.5	105.3
13 有線通信機器	616,600	693,200	761,300	112.4	109.8
14 無線通信機器	392,100	432,900	478,900	110.4	110.6
15 電気計測器	364,002	408,500	454,000	112.2	111.1
16 電卓	203,077	163,100	176,000	80.3	107.9
17 電子部品(合計)	2,813,295 (30.0%)	3,374,430 (30.9%)	3,804,280 (31.5%)	119.9	112.7
18 一般電子部品	1,504,317	1,783,360	2,011,470	118.5	112.8
19 電子管	386,903	431,460	441,010	111.5	102.2
20 半導体素子	311,123	395,910	447,200	127.3	113.0
21 集積回路	604,988	732,700	869,000	121.1	118.6
22 液晶素子*1	(5,964)	31,000	35,600	—	114.8
23 合計	9,371,554	10,913,130	12,095,680	116.4	110.8
24 (電子レンジ,電卓を除く合計)	(9,029,033)	(10,603,630)	(11,759,180)		

25 *1 液晶素子の55年度実績は56年1月～3月だけの実績

Key:

1. FY 80 (actual) [constituent ratio (%)]
2. FY 81 (estimated) [constituent ratio (%)]
3. FY 82 (predicted) [constituent ratio (%)]
4. FY 81/80 (%)
5. FY 82/81 (%)
6. Private-use electronics equipment (total)
7. (Total, excluding electronic ranges)
8. Industrial-use electronics equipment (total)
9. (Total, excluding small calculators)
10. Computers and related equipment
11. Applied electronics equipment
12. Electronics equipment for medical use
13. Wire communications equipment
14. Radio communications equipment
15. Electric measurement equipment
16. Small calculators
17. Electronic parts (total)
18. General electronics parts
19. Electron tubes
20. Semiconductor elements
21. Integrated circuits
22. Liquid crystal elements *1
23. Total
24. (Total, excluding electronic ranges and small calculators)
25. *1 The FY 80 results for liquid-crystal elements are only for Jan-Mar 81

Slow Recovery Rate

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 p 264

[Article by Ryoki Sugita, Editor in Chief of NIKKEI BUSINESS: "Business for FY 82--Low Autonomous Recovery Strength"]

[Text] We asked Ryoki Sugita, editor of NIKKEI BUSINESS, for his outlook on this coming year's business; he expected growth to hover at about 3 percent.

Japan entered FY 82 amid stormy economic problems such as the increasing Japanese-American trade friction and the fluctuations in the yen exchange rate. While it may be said that the economy overall has been recovering since last spring, the actual situation is that a series of positive and negative factors have been in effect. The actual rate of growth during the third quarter of FY 81 (Oct-Dec 81) was -0.9 percent compared to the preceding year, and the decline in exports and the low rate of growth in domestic demand have resulted in a recovery strength that is much less than had been expected.

Our country's economy is in a state of adjustment, much like that following the second oil crisis, but what might be the situation if we compare the present with FY 78, when there was sharp recovery after a 5-year period of adjustment.

(Points of Similarity) The first item of similarity with the stage just before the previous economic recovery is the business environment. Even though the economy is said to be bad, the profit and loss base of business is comparatively stable. The most recent operating profit rate does not suffer in comparison with 1978 values, while the indicators that display the business operating mind are on the same level as in 1978, if not somewhat higher. At the same time, consumer prices are following stabilizing trends, and the employment picture, while suffering somewhat of a decline, is certainly no worse than it was in 1978; when these points are considered, the environment surrounding household finances is roughly the same.

(Points of Difference) On the other hand, there are some factors in this present economic environment which are considerably different from the period following the first oil shock, and there is some fear that these [factors] may apply a braking effect on future economic recovery. The first is that the tax load is considerably heavier in both household and business categories than in the 1978 period. That is to say, income taxes, which had been following a "no increase or decrease" tax adjustment program over the past few years, have actually increased at a rather sharp pitch. This increase has suppressed the increase in households' disposable income and has become a major factor in the stagnation of personal consumption. Secondly, there was a large emergency budget drafted in 1978, by which means public finances sought to play a major role in restoring the economy, but this leverage effect on the part of public finances is completely out of the question now. FY 82 has seen a continuation of FY 81 in that general public financial expenditures have been following a zero rate of expansion, and when seen from

the actual base, public finances have been exerting a minus effect on the FY 82 growth rate.

At the same time, although a relaxed policy is being adopted where fiscal policy is concerned, the fact that the United States is maintaining a high interest rate policy has affected the yen exchange rate, so it is not possible to adopt a super-low interest rate policy as was done in 1978. In addition, the foreign economic environment which envelops the Japanese economy is worse than in 1978. The American economy displayed a fairly strong recovery during 1978, and the three nations of Japan, the United States, and Germany served as the locomotive which pulled world economy forward. On the other hand, the present situation is that both the United States and Europe are mired in stagflation, and large-scale business failures are causing business and social problems. In this situation, the American economic distress is spurring worldwide economic stagnation and nurturing the rapid emergence of the principle of protective trade. Despite the fact that the yen rate has not suffered as much from the high American interest rates as some experts had predicted, the volume of exports has dropped. Just as the economy of FY 81 was supported by a growth in the export rate, this unfavorable export growth rate will probably have a large impact on the overall economy.

(Investment in Facilities, and Individual Consumption) As indicated above, public finances and the international environment are far worse than they were in 1978, and the degree of economic recovery in FY 82 will depend on the increase in business-centered economic activities of the people. Taking this viewpoint, we look first at private investment in facilities, and we see that where there was overall stagnation as a result of medium-size and small businesses' difficulties in FY 81, there is a trend toward increased activity in the area of investments in facilities. Considering the fact that business profits in the last part of FY 81 were comparatively good, the will to invest in order to survive has been strengthened. On the other hand, there is stagnation in exports, worsening trade friction, and blunted domestic demand, [all of] which are causing a psychological withering, and there is the possibility of repeated delays and reductions in investment plans. The government is anticipating a 10.5-percent increase in private investment in facilities, but this may be expecting too much. In addition, the government is anticipating a 14.3-percent growth in private investment in housing, but there has been no reduction in the gap between income-producing power and the cost of homes and land, and this anticipated rate of growth also seems beyond reach. Individual consumption is expected to undergo a moderate recovery as the result of the stable increase in income that will accompany the recovery in business profits and the stabilization process. On the other hand, taxes and social welfare costs are increasing, as mentioned before, and this tempo of recovery is expected to be very moderate.

As a result, the autonomous recovery strength of the economy in FY 82 is not very strong and, first of all, the government's target of a 5.2-percent growth seems unreasonable. It may be possible to eke out a 3-percent growth rate, which may be sustained for 3 years. Since the macroeconomic growth rate is so weak, there is a good possibility that the differences between different types of industries and businesses will grow. Even in the midst of a 3-percent growth rate, there may be a life-and-death difference between businesses

that profit through a conservation of energy and labor practices and those that don't. At the same time, there may be questions of just how to survive and lay the foundations for the 21st century.

Promising Growth Areas

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 265-269

[Article by Yasuhiro Mori, Nippon Kogyo Bank: "Environment and Changes in the Electronics Industries in FY 82"]

> [Text] The Industrial Survey Department of the Japan Kogyo Bank predicts that Japanese industry will maintain a high rate of growth, as before, but that the rate of growth will be somewhat blunted compared to last year.

Scale of 10 Billion Yen Attained in FY 81

The electronics industry in FY 81 continued to grow as before. During the period following the oil crisis, when Japan's economy was in a decelerating trend, the electronics industry drew people's attention because it was bucking the trend in a unique manner and accelerating its growth.

Production during the first part of FY 81 showed an increase of 16.4 percent over the preceding year, to a total of 5.145 trillion yen, and this high rate was sustained during the latter half. There has been a continuing trend of double-digit growth for 3 years, and there is no question that the level of 10 trillion yen will soon be attained.

When we look at domestic demand, electronics equipment for the private sector excluding VTR's, was limited, but the growth in electronics equipment for the industrial sector and the demand resulting from the rational investments on the part of industry prompted stable, increasing trends in electronics parts sector. All export areas are in good shape, and there was an amazing 30.4-percent increase to 2.65 trillion yen, during the first period.

What about FY 82?

The electronics industry environment in FY 82 may be said to be so-so. Some individual highlights are discussed below.

First of all, what is the export environment? As before, the economy of the leading countries has not been able to take advantage of the opportunity for economic recovery, and the developing countries are waiting for the leading countries to show a recovery. Deflationary trends may be diluted from here on as the demand for oil continues to moderate, but there is no denying that the strength of the recovery is weak. Where the exchange rate is concerned, the yen level is correlating well with American interest rates, and this trend will probably continue for a while. There may be a downward revision

in American interest rates by the middle of the year, but there is a good possibility that there will be an upward revision. This is why the yen rate may see short-term fluctuations, but no large rise in the yen rate is expected, so there may be little effect on the electronics industry's finances or its competitive base.

What is of concern here is the latently developing anti-Japanese criticism, which is intensifying in the form of trade friction. There is a good possibility that Japan must give equal importance to measures other than competitive efficiency.

Next, what about the domestic market? Individual consumption reversed the expected trends in FY 81 and lapsed into a stagnated state, but consumers expect that improvement in consumption will accompany a stabilization of prices in FY 82, and a moderate but sure recovery is expected.

The environment surrounding industry is, on the whole, good. Investments in facilities on the part of large industries are being rationalized, a strong investment attitude centered on investment in renovations is supporting the foundation, and a moderate recovery is expected. There is great activity in rationalization of business practices. Government and public expenditures are expected to reflect the recent fiscal administrative situation and settle at a small increase.

As a result, the rate of growth in production of the entire industry during FY 82 is expected to be rather slow, but it is expected to continue to grow as before. Looking at the different areas, industrial-use equipment and electronic parts are expected to lead in growth. In the area of equipment for private use, VTR, the prime mover, cannot be expected to maintain its doubling pace because of the enlarged base on which comparison is made, in addition to which there are the floundering of the audio market and the expected trade friction in color television; thus a slowdown in the rate of growth cannot be avoided. These trends are discussed in greater detail on an individual basis below.

VTR Will Grow at a Rate Greater Than 10 Percent Over a Long Period

VTR has continued to surpass color TV in its long-term high rate of growth and has strengthened its grasp as the main item in the area of equipment for private use. The rate of expansion in the use of VTR in Japan is 10 percent, while in the United States and Europe it is but 5 percent. The expansion rate of household electric appliances will exceed 10 percent. VTR is expected to enter a real growth period should its price be cut to under 100,000 yen. If this empirical rule is to be believed, then VTR will have considerable latent growth potential, and a high expansion in this field can be expected.

The strategy for VTR for FY 82 is to lower the cost and develop small and light portable units. As for performance, developmental competition on multifunctional areas such as long recording, fast reproduction, and program subscription has declined one step, and anxiety on the part of the customer at the time of purchase has been eliminated. The eye of the customer is now

directed at the price, and once the price comes close to 100,000 yen, there is a good possibility for a boom in demand. A portable VTR can be carried anywhere, and camera users love it. Furthermore, the demand for it is taking in 8-mm fans as it finds increased use in households in general and among students. On the other hand, it is important that measures be taken to keep consumers from becoming averse to making purchases because of increased attention to "8-mm video."

In the area of the overseas market, which accounts for 80 percent of the business, the situation in some sectors is that inventory is accumulating, and there may be an erosion in price. This is an area where the effects of the fierce competition between Japanese industries for a share of the market are felt, and there is a possibility that FY 82 will see a change in profit-seeking policies and export strategies through selection of countries and volume.

Stable Growth of Color TV

Color TV and audio play important supporting roles, but they seem to be undergoing development that is lacking in one major respect.

Domestic shipments of color TV have been displaying a weak trend for the past several years as the result of sluggish purchases by consumers either as replacements or as new acquisitions. As consumer purchases recover in FY 82, a groundswell in demand much like that seen when TV first became popular may reappear. It is expected that there will be continued restrictive practices as far as exports to Europe are concerned, and because of the trade confrontation, no large increase in exports to the United States can be expected. There is a strong, latent demand potential in other countries, but the non-oil-producing countries are suffering from deteriorating foreign exchange--although there may be some fronts where there could be recovery.

The audio market, which has been moving at a high level, has seen a worsening of its export environment, in addition to its having run its course, and has been in a distressed state since the summer of FY 81. Part of the background for this is believed to be an aversion on the part of consumers to make purchases because of the talk about digital audio. At the same time, there seems to be a depletion of new ideas for new products, such as the radio cassette, that evoke new demand. This set of severe conditions is expected to continue through FY 82, but the situation is not completely hopeless. Small components are catching on among the younger set and may make up for the drop in syscom. Digital audio will make its appearance after this fall. The stage may not be reached for full-fledged market development, but [digital audio] is expected to make a considerable constribution to increased sales.

Software Is the Main Topic Vis-a-Vis Video Disc

What is being regarded with interest is the direction taken by video disc, which has been developed as a large sales item by domestic and foreign companies, following on VTR; a VHD type will be coming onto the market along the optic mode. When this item increases in popularity, the demand for it

probably will approach that of a craze, but because it does not have recording capability, attention will have to be directed at the software and volume record if it is to evoke general interest.

Computer Demand at Same High Level as Before

The demand for computers and related equipment is sustained by a strong desire to rationalize and automate various sectors, and this high demand is seen from large types of units to supersmall units. Semiconductor technology development is promoting the low-cost, highly reliable, multifunctional properties of information equipment, while office automation (OA) is beginning to be accepted as a regular item. No change in active demand seems possible at this time.

The demand for general-use computers, which are the main items, is predicted to continue to grow at a high rate as a result of consumers' increased business volume and the desire to enter into a network system. FY 82 is the special year in which the new, very large computer series will make their appearance, and a large market is expected to be opened up. There will probably be a fierce fight for market share between IBM and the domestic forces. Preparations for the OEM (original equipment manufacturer) system are proceeding in the export area, and good growth including peripheral and terminal equipment is expected.

Demand for small types of equipment, such as office computers and personal computers, is also active. This demand is the result of development in diverse treatment, their use by department and section units in large industries, and the desire of medium and small industries to rationalize operations. Businesses are beginning to become aware that reinforcing information capabilities is an important way to lower costs in indirect areas and to respond quickly to changes in environment, and these trends are expected to remain active beyond any short-term improvement in business. On the other hand, it is believed that various types of good-quality software must be available if this OA boom is to remain unchilled and to leave behind absolutely no aftereffects. With the increasing reinforcement of sales strongholds in overseas areas, continued high growth in exports is expected.

Communications Equipment; Anti-American Friction Is of Concern

Looking now at communications equipment, first of all, a major trend reversal is expected, in that the demand by the Telegraph and Telephone Public Corporation, which will spend 1.72 trillion yen for construction, represents a decrease of 28 percent from the previous year. On the other hand, demand by the private sector reveals a great need for facsimile [equipment], in-house electronic exchanges (EPBX), and pushbutton telephones. Foreign countries evaluate the main products exported overseas highly, and the Telegraph and Telephone Public Corporation's deficit will probably continue to be more than made up.

Of great concern at present is the increasingly protectionist attitude of the United States. Should there be a revision in the communications law designed

to close the market to Japanese-made goods, there will be no question but that exports to the United States, which account for one-third of [total] exports in communications equipment, will be dealt a major blow. Communications are intimately tied in with national defense and also are a future strategic industry, but there are some problems which cannot be ignored from an economic standpoint, making any solution very difficult. Japan is in a dilemma, in that the better Japanese technology becomes, the more this friction will increase.

What is clear is that the optical industry, which is considered to be the next-generation large technology, finally seems ready to take off. The Telegraph and Telephone Public Corporation's INS concept will really get moving in FY 82; its main transmission pathways will be optical communication systems, and commercialization is being promoted over the entire country. The market directed at general industry, including in-plant measurement and control systems, is gradually being developed.

Electronic Parts in Good Shape, Except for One Area of Distressed Growth

Electronic parts have maintained a long period of good growth. In addition to the good showing of electronics equipment, particularly VTR, and the expansion of exports reflecting the high foreign evaluation, there is also expansion in the utilization area with the development in trends to mechatronics that is responsible for this trend. This increasing trend will continue in FY 82. On the other hand, it probably will be difficult to maintain such high rates of growth as in the past. Because equipment manufacturers are introducing miniaturization, lightness in weight, and costdowns, greater use of IC [integrated circuits] and composite systems is being promoted in the parts used, and there are signs of troubled growth in the area of resistors and condensers.

IC has become a basic industry through its role as a general-use intelligent fundamental material, and FY 82 will see the start of shipments of 64K-class items. Their price is undergoing a sharp decrease--only some four times that of the 16K class, which is considered the ordinary-level item. Consumers are anxious to see the introduction of this item, as a result of which the market is witnessing sudden activity, and the different manufacturers will probably increase production facilities, with an accompanying increase in production.

What is worthy of note here is the direction being taken by the American industrial world, and there is a resurgence in anti-Japanese criticism. Where Japanese manufacturers had been able to garner a 40-percent share of the 16K RAM market in the United States, it is reported that the share of the 64K RAM is already 70 percent. American industry is considering coming up with complaints claiming dumping, and it is said that the Department of Defense, citing the fear that domestic industry may be weakened to the point that it will be too weak when it is needed, is going to propose the activation of national safety conditions. [Our] problems with the United States seem about to be rekindled on a level much beyond what they have ever been.

In another direction, American manufacturers are taking aim at Japan's high labor productivity and process control technology and are actively locating their plants in Japan. This move, coupled with the Japanese manufacturers' reinforcement of their plants on American soil, seems about to reorient the worldwide situation insofar as the semiconductor industry is concerned.

From the above discussion, there is no question but that the electronics industry will continue its high growth rate in FY 82. On the other hand, this area includes a large number of problems that need to be resolved. Finally, some of the principal subjects will be discussed.

The first subject is the response to the increasing load of investments in research and development facilities. As seen in the example of the IC industry in the most recent years, there is a very rapid tempo in technological innovation, and the industry is increasing its status as a capital-accumulating industry because of the necessity to always be able to invest in high-level facilities. For example, the scale of investments in research and development facilities where IC is concerned amounts to more than 30 percent of sales, while the life cycle of the facilities has dwindled to 4 years. In the future, both technological development strategy and reinforced fiscal strategy will become indispensable functions, and a company's fate may well be determined by its ability to make investments.

Secondly, there is the response to changes in product makeup. Changes in product makeup resulting from rapid technological innovations are factors which accelerate changes in industrial composition and expand differences between industrial levels. An example that can be given here is the transition from crossbar exchanges to electronic exchanges in the communications equipment industry, accompanied by a trend for large industries to handle by themselves the production of principal parts; this is also reflected in the share makeup between the large manufacturers.

The most important theme is how to avoid trade friction. The electronics industry is an important pillar as an industry for acquiring foreign capital, and avoidance of friction has become a national need. This is why the basis of the problem differs between private use and industrial use and for IC. Where private use is concerned, the Western countries are trying to create opportunities to purchase from a well-equipped Japan, but where industrial-use IC is concerned, and the United States is moving to set up early defenses against a Japan which is ever gaining strength. At the same time, it is desirable that changes in production deployment accompanying technological innovation be conducted in as short time as possible in order to avoid friction with developing countries.

Although there is no special remedy that is expected to have any effect in this situation, it may be necessary at this stage to limit exports and reinforce on-site production as means of escaping this anti-Japan criticism. On the other hand, there are some promising aspects of our technological strength, and technological agreements, promotion of joint development, and establishment of cooperative systems may be needed. We are certainly entering an era where every effort needs to be made to overcome all ordeals.

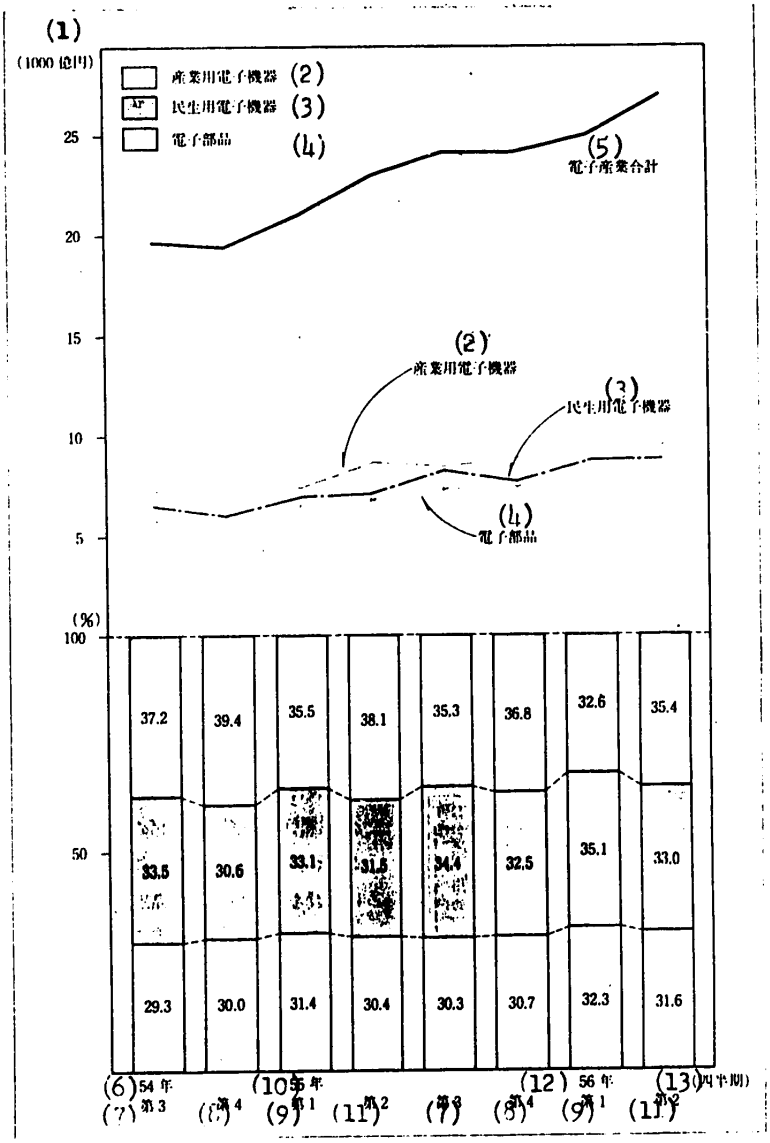

Figure 1. Trends in Production and Makeup Ratio of the Electronics Industry

Key:

1. 100 billion yen
2. Industrial electronics equipment
3. Private-use electronics equipment
4. Electronic parts
5. Total for electronics industry
6. 1979
7. 3rd
8. 4th
9. 1st
10. 1980
11. 2nd
12. 1981
13. Quarter

Fierce Competition

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 270-273

[Article by Mutsuo Kodo and Mikio Kanno of the Editorial Department, Nikkei Electronics: "Production Scale of Electronics Equipment for Private Use To Rise to 4 Trillion Yen Level"]

[Text] Both Domestic Demand and Exports in Fierce Environment

The environment surrounding the private-use electronics equipment industry in FY 81 is not necessarily clear. The floundering economy and the lack of growth in demand both overseas and at home stand out. VTR, which for the past few years had been responsible for the good record achieved by electronics equipment for private use, has seen its rate of growth stunted, although this may be due partly to the vast scale of its market. At the same time, sound equipment centered on system components has seen demand fall in both domestic and foreign markets, and every producer has been forced to cut back production. In addition, the video disc system, which appeared on the Japanese market in the fall of 1981, and DAD (digital audio display), which is expected to be put on the market in the fall of 1982, will require some time before their markets are developed.

VTR, which first emerged in the mid-1970's and has since increased production several times over, through various video games, attained a monthly production figure of 1.12 million units in October 1981, breaking the 1 million barrier. This was the result of the frenzied efforts of every manufacturer to boost production in order to respond to the tremendous domestic and foreign demand. It is expected that monthly production as a whole will reach 1.4 million units in the spring of 1982. On the other hand, there is a trend, which set in about the fall of 1981, toward reduced growth in demand, and there is the possibility of excessive supply should all manufacturers maintain full production.

In the fierce fight for [market] share being conducted between Beta and VHS modes during the past few years, Tokyo Sanyo Electric, which is a daughter company of Sanyo Electric and has been a mainstay of the Beta camp, last year joined the VHS camp, and this activity by the VHS forces stands out. Beta camp followers, such as Sony and Toshiba, seem to be retrenching somewhat, but there is not expected to be any change this year in the ratio of seven VHS companies to three Beta companies.

The video disc system, for which the household electric appliance industry has high hopes, saw the introduction in the market last fall of new products in the form of CED (grooved static capacity) in the United States and optic mode in Japan. Their sales have not affected the market. VHD (grooveless static capacity), sale of which had been expected to start in the spring of 1982, now has been postponed indefinitely. Despite these harsh conditions, there is still strong demand for private-use electronic equipment, and there is no doubt that the overall picture will see an improvement over the record in 1981.

VTR for Household Use: 10 Million Level Passed, and Growth Blunted

VTR production in 1981 (calendar year) exceeded initial estimates by more than 1 million units, to a total of 9.5 million units. This is a very sharp rise of 2.1 times that in 1980. As for deliveries, 1.55 million units were destined for the domestic market (an increase of 67.4 percent over the previous year) and 7.35 million units for the foreign market (113.6 percent over last year). There are many who predict that production in 1982 will total 11-12.5 million units.

The rate of use in Japan at the end of 1981 was thought to be roughly 10 percent. It is generally the case that once the rate of use for a household electrical appliance breaks the 10-percent barrier, there is a sharp rise in demand. This is why the industry has high hopes for 1982. On the other hand, VTR began to see demand decrease in 1981 just as the 10-percent rate was at hand, and this trend is continuing into 1982. Because of this situation, there have been some predictions that "it will be difficult for production to attain 11 million units in 1982."

Product activities are seeing both the VHS and Beta camps strengthening their multifunctional capabilities, and there are an increasing number of units which can perform fast sending regeneration, static, images, and Koma transmission. Miniaturized VTR is proliferating rapidly, and sets which weigh 3.8 to 4 kg or less, including the battery, have appeared. It had been said 2 years ago that "5 kg will be the minimum weight" possible for portable sets, and thus the speed of the development of miniature and lightweight sets is truly amazing. There is no doubt that there will be even greater miniaturization and reduction in weight in 1982. At the same time, miniaturization and weight reduction are the top themes for the small color video camera to be used with the portable VTR. On the technological side, it is noteworthy that attention is being directed toward developing products which use a solid state image element such as MOS [metal-oxide semiconductor] or CCD [charge-coupling device] for the imaging section; sales of video cameras using solid-state imaging elements are expected in 1982, following the first sales of this type of product by Hitachi Limited in 1981.

Reduction in price is also one of the major themes with VTR. At the present time, the higher class items run 220,000-230,000 yen, the ordinary-type units cost 160,000-170,000 yen, and the unit function low-cost units about 140,000 yen. The lowest priced item is the Sharp "My Video," which goes for 129,000 yen. Since there seems to be a shadow being cast over any increase in demand in both domestic and foreign markets, this lowering in cost to stimulate greater demand seems to be the main point with the manufacturers.

Color TV: Expectations for System Color TV

Total production for 1981 (calendar year) was 12.64 million units, which in the course of the year broke the former record of 10.9 million units set in 1980. Whereas exports (excluding kits) increased 23.1 percent over the previous year to 4.91 million units, domestic shipments declined 3.5 percent to 6.56 million units, displaying the difference in trend between domestic and

foreign markets. On the domestic front, the miniaturized personal TV, which was the item responsible for the increased demand in the past several years, has seen a decrease in demand. There is stable demand for medium and large multifunctional sound storage units; these run about halfway in demand, but growth is stunted.

In addition to the situation described above, the economic picture in Japan has failed to improve, and the net result has been a decline in domestic shipments during 1981 from the preceding year.

On the other hand, the bud of a new development is emerging in the area of color TV, which overall is not enjoying good growth. This is system color TV. System color TV has a number of terminals and incorporates VTR, video disc player, and audio equipment capabilities. In addition to the situation whereby VTR has actually gained popular status on the domestic front and the fact that video discs will appear on the market in the fall of 1981, there is considerable interest in this system as a new-media color TV. The manufacturers started real work on this system last year, and the fraction of this product with respect to the total color TV field is still at the single-digit level; there are assurances, however, that there will be a sharp increase in demand. There are some in the industry who say: "This will be the mainstream of color TV in 2-3 years."

Exports during 1981 to the EC (European Community) was 670,000 units, down 2.9 percent from the previous year, while exports to the United States increased 51.8 percent to 740,000 units as the result of increased demand caused by the popularity of CATV. The EC is seeking a self-imposed limit on exports in 1982, and the problem of trade friction with Europe is presently rather muddled; however, demand from the United States and from Middle and Near Eastern countries has remained as strong as before, and the overall picture seems favorable to continued growth.

Video Discs: Slipping Out of Tune

The large household electrical product on which the industry has been placing its expectations as the mainline item for the 1980's is the video disc (VD), which has finally appeared on the market. In Japan, Pioneer first came out with the optical-type system in October 1981, while the American RCA came out with its CED (grooved static capacity) mode in March 1981. The Japanese firms Toshiba Corporation, Hitachi Limited, and Sanyo Electric have also started marketing the same type of equipment as the Americans. The Japanese companies not only market their own brands but supply OEM (under the respective merchandisers' brandnames) to large American retail outlets such as Sears, Roebuck and J.C. Penney. In addition, Japan Victor and Matsushita Electrical Industries plan to market their VHD (grooveless static capacity) model in April 1982.

Video discs, which emerged amid great expectations, are not enjoying favorable sales. Pioneer in Japan had expected sales of about 5,000 units per month, but only in the first month was this target met, and sales have dropped to about 3,000 units per month. In the United States, RCA had aimed at initial

sales of 200,000 units per year, but actual sales languished at less than half the targeted level, at about 65,000 units. The main reason for this sales inactivity is the small number of discs (recording bases), which does not arouse the customers' interest. In Pioneer's case, it had come up with but 160 titles by the end of March of this year. Since there are roughly 70,000 different records for audio use, there are many knowledgeable people who say: "The number is too small." At the same time, the contents of disc are centered on movie and TV programs, and there is nothing which exploits the features of video disc; this is another factor responsible for the low demand.

Because of this situation, inventories are stockpiling in the United States, and bargain sales have started. In the case of the CED mode, the number of sales below 300 dollars has increased, and RCA lowered its true price down to 350 dollars as of February and started to sell its new product. Some persons in the household electrical appliance industry say that when the VHD mode is marketed this spring, there will be a brisk demand for video discs; however, there is a good possibility that such a development will in the end be just a hopeful dream.

Sound Equipment: "Structural Recession" Intensifies

The audio market tended to be low-key in both the domestic and foreign markets in 1981, and the growth rates of every product with the exception of tape recorders stopped at the single-digit level (production base). So-so demand and consumer coolness resulted in domestic demand's just breaking at 3 percent over the previous year, while European and American markets are in state of inventory excess. Almost all of the powerful manufacturers such as Pioneer, Sony, and Toryo have cut back production in order to adjust inventories, and production for 1982 will probably end on a low note. Because the confusion in sales aimed at reducing inventories has brought chaos to retail prices, audio will probably remain in a state of "structural recession" as long as the overproductive nature of the industry is not rectified. It is already a "recessed industry type index."

Although large growth is not expected, the demand for audio, centered on the younger generation, will remain strong. Both the competition to develop new products and the [market] share confrontation to meet these needs will probably intensify.

System components (syscom), the mainline product in the audio area, suffered a great decline in 1981, and this trend is expected to continue this year. Domestic shipments are expected to drop 20 percent for the second year in a row. In its place, small components are coming out. Design innovations utilizing electronic switch or photo diode display aimed at young men and women may well make rapid advances. In view of the 60-percent rate of use of stereo, the sale of small components as "second-generation stereo" has possibilities which have manufacturers excited.

The popularity of headphone sets, represented by Sony's "Walkman," shows no sign of abating. New products incorporating Dolby noise-reduction circuits

may make their appearance. Radiocassettes will see multiple functions and high add-on value additions. It may be of note to see how well microcassette equipment is received in the music field. Accompanying the multifunctional nature and miniaturization of audio equipment, it is believed that application of micons and semiconductor memory and the introduction of IC into main circuits will become more popular.

In the area of digital audio, it may be well to note just how DAD and PCM processors utilizing VTR will proliferate and what degree of development will be seen in digital cassettes.

DAD (Digital Audio Disc): Possibly 3 More Years Before Real Use May Be Expected

Digital audio disc (DAD), which has already been highly evaluated as the "new era record" to follow LP, is expected to appear on the market this fall. The Phillips Company (Holland) and Sony produced an optical mode compact disc (CD) through joint development. This unit has become the world's standardization norm, and the powerful manufacturers of Japan and Europe have entered into patent agreements with Phillips in order to go into CD system marketing.

There have as yet been no specific announcements of production volume or starting dates, but the large Japanese companies that have strong semiconductor technology, headed by Sony, are planning to display this product at the "All Japan Audio Fair" this fall. Among these companies, those with record companies under their umbrella--such as Phillips, Sony, Matsushita Electric Industries, Hitachi Limited, Toshiba Corporation, and Pioneer--are being watched closely for their moves.

It is said that the cost of the player will be at least 150,000 yen, because of the high cost of the semiconductor laser that is the heart of the system. It is not known how many different types and what volume of records, which hold the key to popular acceptance, will be on hand by that date, but many manufacturers anticipate a large demand for players. It seems to be the general consensus that it will be 3 years before really popular acceptance will be seen. There is a possibility that some manufacturers will come out with a product this year.

On the technological side, the major problems are just how to improve the yield of semiconductor lasers and to establish know-how in the mass production of discs. In addition, there must be interchangeability between discs and players made by different soft manufacturers and hard manufacturers. There may be detailed conferences before long as to how to maintain quality throughout the system.

Japan Victor's AHD mode can use both the VHD mode of the video disc and the play, and there is a possibility that it may reemerge should VHD become popular.

Table 2. Estimated Production of Electronics Equipment for Private Use
(Volume Unit: 1,000 Items; Monetary Unit: 1 Million Yen)

	1 55年度(実績)		2 56年度(推定)		3 57年度(予測)		4 56/55年度(%)		5 57/56年度(%)	
6	数量	7 金額	数量	金額	数量	金額	数量	金額	数量	金額
8 民生用電子機器合計	—	3,292,909	—	3,882,500	—	4,152,100	—	117.9	—	106.9
9 電子レンジを除く合計	—	3,153,465	—	3,736,100	—	3,991,600	—	118.4	—	106.8
10 ・テレビ受像機(キットを含む)	16,985	805,773	15,640	789,500	16,070	803,600	92.1	98.0	102.7	101.9
11 カラー・テレビ	12,069	724,154	12,880	742,000	13,500	759,000	106.7	102.5	104.8	102.3
12 白黒テレビ	4,916	81,619	2,760	47,500	2,570	44,600	56.1	58.2	93.1	93.9
13 ・家庭用VTR	5,341	671,061	10,700	1,205,000	13,700	1,420,000	200.3	179.6	128.0	117.8
14 ●磁気録音再生装置	60,574	921,121	63,300	973,000	68,500	1,023,000	104.5	105.6	108.2	105.1
15 一般テープ・レコーダ*1	46,547	723,186	47,400	737,000	51,100	762,000	101.8	103.3	107.8	103.4
16 カー・ステレオ	13,536	193,324	14,900	228,000	15,900	250,000	110.1	118.0	106.7	109.6
17 その他	491	4,611	1,000	8,000	1,500	11,000	203.7	173.5	150.0	137.5
18 ●ステレオ・セット	3,027	91,693	3,140	99,000	2,980	89,000	103.7	108.0	94.9	89.9
19 ●ステレオ・コンポ	—	514,915	—	501,500	—	487,000	—	97.2	—	97.1
20 FMチューナ	4,036	72,827	4,400	75,300	4,350	71,500	109.0	103.4	98.9	95.0
21 HiFi用増幅器	8,539	221,882	8,540	211,500	8,530	208,500	100.0	95.3	99.9	98.6
22 レコード・プレーヤ	7,729	123,910	8,650	130,000	8,640	126,000	111.9	104.9	99.9	96.9
23 HiFi用スピーカ・システム	6,459	96,296	5,880	84,700	5,870	81,000	91.0	88.0	99.8	95.6
24 ●ラジオ受信機	17,759	102,838	17,070	102,100	16,750	101,000	96.1	99.3	98.1	98.9
25 一般ラジオ*2	9,186	42,114	9,100	44,600	8,950	44,100	99.1	106.0	98.4	98.9
26 カー・ラジオ	8,573	60,724	7,970	57,500	7,800	56,900	93.0	94.7	97.9	99.0
27 ●その他の民生用機器*3	—	46,064	—	66,000	—	68,000	—	143.3	—	103.0
28 ●電子レンジ	2,019	139,444	2,440	146,400	2,720	160,500	120.9	105.0	115.5	109.6

29 *1 テープ・デッキを含む
30 *2 キットを含む
31 *3 電気蓄音機，拡声装置，補聴器，CBトランシーバ，自動車用スピーカ・システムの総計

[Key on following page]

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APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500080077-4

Key:

1. FY 80 (actual record)
2. FY 81 (estimated)
3. FY 82 (predicted)
4. FY 56/55 (%)
5. FY 57/56 (%)
6. Volume
7. Value
8. Electronic equipment for private use
9. Total, excluding electronic ranges
10. TV receivers (including kits)
11. Color TV
12. Black and white TV
13. VTR for household use
14. Magnetic sound-reproduction device
15. General tape recorder*1
16. Car stereo
17. Others
18. Stereo set
19. Stereo components
20. FM tuner
21. HiFi amplifier
22. Record player
23. HiFi speaker system
24. Radio receiver
25. General radio*2
26. Car radio
27. Other equipment for private use*3
28. Electronic range
29. *1 Includes tape deck
30. *2 Includes kits
31. *3 Total of electric record players, voice amplifiers, hearing aids, CD transceivers, and automobile speaker systems

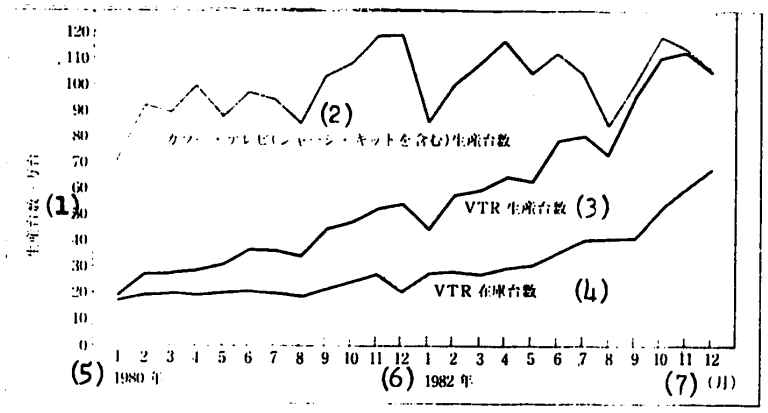

Figure 2. VTR Production and Inventory of VTR, According to MITI Statistics

Data on Color TV Also Included for Reference Use

Key:

1. Production (10,000 units)
2. Production of color TV (including chassis kits)
3. VTR production
4. VTR inventory
5. 1980
6. 1982
7. Month

Electronic Ranges: Small Increase in Domestic Demand; Exports to Europe, for Example, Will Continue To Grow

The production of electronic ranges in 1981 exceeded 2.4 million units, which represented a 29-percent increase (in number) over the previous year. Of this total, 800,000 units were sold in Japan, and the remainder was exported to the United States and other areas. No large increase in domestic sales can be anticipated for FY 82. The manufacturers have come out with a low-cost, single-function unit costing about 50,000 yen to root out latent demand, and there may be an increase of 100,000 units to 900,000, if only the number of units is considered.

The plants which various manufacturers have established in the United States have gone onstream, so exports to the United States are expected to remain about the same as last year. A considerable increase in the number and value of exports to Europe and Australia is expected.

Composite ranges capable of oven cooking and steaming of food account for roughly 80 percent of the total oven types. A recent development has been the teaming together of a microcomputer and a sensor, whereby all the consumer has to do is to place the food in the range and operate the starter switch, after which the computer takes over; the number of units of this type is increasing. There also are some models in which voice commands are used to operate voice-synthesis-installed units to prepare the food.

Good Growth for Computers

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 274-277

[Article by Norio Aoike, NIKKEI ELECTRONICS Editorial Office: "Computers, Communications Equipment, and Measurement Equipment To Maintain Double-Digit Growth"]

[Text] Overall Reinforced Aim Is To Export; [Japan-U.S. Trade] Friction Is of Concern

Computers and Related Equipment: OA and Dispersed Transactions in Full Force

Domestic demand is languishing, while exports are stagnating in the harsh economic environment facing the industrial world, but the computer industry, bucking the trend, is expected to continue its high rate of growth through FY 82. The rate of growth is expected to be about 17-20 percent, and, together with related equipment, production is expected to take a large step toward the 2 trillion yen mark. It was in 1979 that the computer industry became a 1 trillion yen industry, and this rate of growth is truly amazing. At the same time, the industries which are responsible for this growth are also noted for their effective conservation of labor, conservation of energy, and rational investment practices, which is a noteworthy item.

A trend to be noted in FY 82 is the full-scale emergence of OA (office automation) and dispersed handling. OA, which first boomed in FY 81, may go on to blossom forth fully in FY 82. Because the time for celebrating is over, this sector may appear to be in a state of stagnation, but the industry has great plans to rationalize those business areas that lag behind the production areas in the matter of automation, and individual OA items such as office computers and Japanese-language word processors are being introduced in various areas. The day for OA in business is not far off, and systematized ties with communication can be expected, but this is an area in which very little has been done by the manufacturers, and it will be interesting to see to what extent specific moves in this direction will occur in FY 82.

As far as general-use computers are concerned, the new intelligent large computers which all the companies had been gearing up for in FY 81 will now be the subjects of a sales war. Assuming that the announcement of receipt of orders for large computers is concentrated in the year of the announcement and the following year, FY 82 may be said to be the make-or-break year, and the significance of the outcome will be great. IBM, which is trying very hard to catch up in its own country, came out with the sale of its "3081-K" at the same time that it announced a new architecture and control program in an effort to shake off its pursuers; consumer reaction to these new products is being awaited with interest.

Up to 550,000 Personal Computers

The office computer, the personal computer, and the Japanese-language word processor, which are called the three sacred treasures of OA, are all expected to undergo sharp growth during FY 82. Shipments of office computers are expected to total roughly 45,000 units in FY 81, and sales to total more than 300 billion yen. They have already attained a considerable scale, but it seems certain that FY 82 will see growth of about 30 percent above the previous year, and the sales total is expected to go over 400 billion yen. It was in FY 80 that office computers hit the 200 billion yen level, which means that sales will have doubled in the short space of 2 years.

A large part of this sharp growth may be attributed to demand on the part of large industries. Office computers formerly were the computers for mainstay industries that could not afford general-use computers, and for medium-size and small businesses. As a result, a product that was both not too high and not too low in price was the main line. The recent situation, however, has been that top-grade and low-priced equipment has been selling well, while the demand for medium-grade computers has languished. The customers for low-priced computers have been medium-size and small businesses which were introducing computers for the first time, while high-grade computers have quite recently been finding favor among large industries to augment their office computers. The remainder are taken up by a leveling of the demands of previous consumers. Because of the addition of large-industries--other than previous consumers--that desire to go into dispersed handling, the pie is rapidly growing larger and larger.

It is expected that the demand on the part of large industries seeking to introduce dispersed handling will make up the greater part of this market expansion in FY 82. As a result, manufacturers, and particularly the large manufacturers, may put more effort into production of high-quality computers. There are many high-quality items of equipment that have several work stations with a communications function, and this type of function may see even greater proliferation. General-use computers with up to 32 stations made their appearance in FY 81, and further increases in the number of these computers, as well as some with even more terminals, are expected to appear in the market. At the same time, there are efforts to use office computers for more varied work, and computers with multiple functions and a capability for doubling up are expected to be developed, while the newly appearing types are expected to be provided with a word-processing capability and an image-treatment capability.

Shipments of personal computers will probably approach 550,000 units, almost double the FY 81 output. Sales are expected to surpass the 100 billion mark, and there are many estimates that visualize a 60-percent increase over the previous year, to 120 billion yen. The "Survey of Computer Users," compiled by NIHON KEIZAI at the end of 1981, showed only 58 percent of the industries listed at the First Tokyo Stock Exchange have introduced personal computers; the average use was 18 units, indicating a good possibility that these were but trial introductions, so there is a good possibility that FY 82 will see the full-fledged use of office computers.

The driving force here is the 16-bit unit, which all manufacturers introduced during the latter half of last year. The 8-bit unit used in the past required considerable handling time, and not only were input and output time-consuming, but the [units] possessed a small memory capacity and could handle programs of only a limited nature, as a result of which they were not well suited to business. The introduction of the 16-bit removed with one fell swoop all these problems that had been experienced in the past. The manufacturers have been influenced by this demand for 16 bit and are showing more of a tendency to market the 16 bit, and there is a good possibility that the relative positions of the 8 bit and 16 bit will be reversed during the course of FY 82.

The market scale of word processors is still small. There seems to be a good possibility that shipments for FY 82 will triple the FY 81 level to 60,000 units, but the 100,000-unit level may be difficult to attain, because the frequency of use in any given sector is less than that of other OA equipment. A large contest to reduce prices started last year, and this contest is expected to become even more fierce in FY 82, so that the total sales figure will not be expected to rise much above 40 billion yen.

There are presently a number of input modes to word processors, but most of these are attuned to the professionals, and most amateurs find them difficult to use. Furthermore, there are advantages and disadvantages to every mode. This is why a number of manufacturers started introducing units which allow the use of a number of input modes. This trend is expected to become even stronger in FY 82, and the chances are good that the user will have his choice.

Although there is not expected to be much of a market for this in FY 82, activities in local networks for systematizing, which is expected to be the future direction of OA, are drawing attention. There already are lans, centered mainly on the foreign-financed manufacturers, to market this product, while domestic manufacturers have also begun earnest development, and some products are expected on the market in FY 82. In the systematized OA market of the future, the manufacturer that receives orders for a local network will be in an advantageous position, because he can expect orders for the various sundry items of equipment to be connected to this network; the future competition revolving about this local network is expected to be even more fierce than that which surrounds the sales confrontation for individual OA equipment.

Order Situation Good for General-Use Large New Computers

The market for general-use computers was augmented by the introduction of new intelligent large computers, starting with Nippon Electric's "ACOS 1000" and ending with the Fujitsu "M-380," and a fierce conflict is in progress. There are already in operation more than 3,000 general-use computers made in Japan, and the greater part of the demand is in the form of replacements. General-use large computers have model changes every 4-5 years, and about one-third of these installed units will be replaced by the new computers, which it has been announced will cost 1 billion yen each. This is expected to become a 1 trillion yen market, and the potential of this market remains as high as ever.

It requires more than a year from the receipt of an order for a large type of general-use computer until its delivery, and the announcement of orders is concentrated in the year after product announcement. When put in terms of the life cycle, when an order is made after 3 years, a new series will appear before there has been much use on the old model. FY 82 is the second year following the announcement by the various companies of their present series, and it is the final year in which orders will be concentrated. This is why the sales competition is expected to be so fierce this year. Orders after 1 year were "good beyond expectations," according to all the companies involved, but the situation should be resolved by the end of this year. As long as there is room for market growth, a fierce battle for the market, even beyond expectations, may be even more forthcoming than in OA.

IBM, which plays a major role in the sales battle, announced its "3081-D" in November 1981 and then entered the market with its "3081-K" a year later. K surpasses D in computing speed and performance, but what is of note is the simultaneous announcement of a new architecture and system control program. Should the architecture and control program be altered, manufacturers of IBM convertibles (interchangeable software) will require more time to make the conversion, and [IBM] will be at a great disadvantage in the competition. It may be surmised that IBM had this point in mind, and it will be interesting to see whether its goal is realized. Among the computers for general use, the small models are finding increased demand as terminal controls in dispersed handling, through demand for a host in a centrally concentrated transaction. There seems to be no doubt that this area, even moreso than the large units, will see a growth of 20 percent in FY 82.

Minicoms, which are used in scientific and technological computations and in on-site production control, are expected to undergo large growth in FY 82. Because many of these are incorporated into various equipment items, they are not flashy in appearance, but some manufacturers are eyeing close to a 50-percent rate of growth. At the same time, minicoms basically are suited to dialog-type dispersed transactions, and moves have been initiated to introduce them for business transactions in areas where nothing has been used before. Such moves have already been introduced in the United States, and some foreign-funded companies such as Japan Data General may head this movement in Japan. In the area of specific product activities, the so-called super minicom, which is a 32-bit instrument, is expected to see further increases. The 32-bit minicom has transaction speed and memory capacity which are difficult to distinguish from the general-use large computers, and this differentiation is becoming even more difficult as its market for business use expands even more.

Exports of Domestic Makes to Reach 200 Billion Yen

There is a need to pay close attention to exports as well as to domestic demand in FY 82. The large domestic manufacturers have completed preparations for an export system to the United States and Europe, and some good results are expected, regardless of whether the product is computers for general use, office computers, peripheral equipment, or terminal equipment. In addition, sole manufacturers of personal computers and manufacturers of terminals are expressing a strong desire for exports. Even though total sales are rather small, this is an area that bears watching.

Fujitsu entered into a cooperative agreement during the end of 1981 with the British state computer corporation ICL. This will be the third partner where large computers are concerned, following Amdahl in the United States and Siemens of West Germany. It will be 1983 before the export of computers to ICL will start, but the fact that ICL was rescued from the competition put up by IBM and was once more able to take its place among "the world's giants" will probably raise Fujitsu's esteem in the eyes of the world. An agreement has been reached with TRW where terminal equipment is involved for the establishment of a sales company, and the activities of this company are now on-stream, indicating that the laying of the foundations for exports is about over, and an increase of roughly 50 percent in exports to about 90 billion yen is anticipated for FY 82. In addition, this company is aiming toward an export ratio of 30 percent in FY 85 (it was about 13 percent in FY 81).

Nippon Electric will also double its exports of office computers to the United States in FY 82. It will also reinforce exports to Southeast Asia and Australia. The dealer network in the United States has been completed, and the plans are to sharply increase exports of office computers and personal computers, starting in FY 82, and to pioneer the way to large computer exports. In addition, Hitachi Limited will engage in OEM export (exports using the brandname of the customer) of its large computers, which have demonstrated their worth, and will begin exporting personal computers in FY 82, while Toshiba Corporation, Oki Electric, and Mitsubishi Electric are to expand their exports of OA equipment. Many manufacturers other than the large firms are

Table 3. Predicted Production of Electronics Equipment for Industrial Use
(Volume Unit: Pieces; Sales Unit: 1 Million Yen)

8	産業用電子機器合計*1	—	3,265,350	—	3,656,200	—	4,139,300	—	112.0	—	113.2
9	(電卓を除く合計)	—	3,062,273	—	3,493,100	—	3,963,300	—	114.1	—	113.5
10	●コンピュータおよび関連装置	—	1,360,421	—	1,612,400	—	1,897,700	—	118.5	—	117.7
11	▷ディジタル型	—	1,200,187	—	1,426,400	—	1,681,900	—	118.8	—	117.9
12	コンピュータ本体	19,489	520,838	25,300	611,000	32,200	719,000	129.8	117.3	127.3	117.7
13	一般用	16,392	487,966	21,300	575,000	27,000	679,000	129.9	117.8	126.8	118.1
14	制御用	3,097	32,872	4,000	36,000	5,200	40,000	129.2	109.5	130.0	111.1
15	周辺装置	—	375,425	—	453,500	—	532,000	—	120.8	—	117.3
16	外部記憶装置	267,210	243,752	376,000	295,000	461,000	346,000	140.7	121.0	122.6	117.3
17	入出力装置	113,776	131,673	327,000	158,500	417,000	186,000	287.4	120.4	127.5	117.4
18	通信制御装置	1,405	19,025	1,800	23,000	2,300	27,400	128.1	120.9	127.8	119.1
19	端末装置	226,451	284,899	307,000	338,900	385,000	403,500	135.6	119.0	125.4	119.1
20	▷補助装置	53,993	39,324	60,400	41,000	73,000	46,000	111.9	104.3	120.9	112.2
21	▷コンピュータ応用装置*2	43,777	120,910	53,700	145,000	64,100	166,800	122.7	119.9	119.4	115.0
22	●電子応用装置*3	—	201,917	—	213,100	—	231,400	—	105.5	—	108.6
23	▷X線装置	25,417	85,957	24,500	84,000	24,900	85,500	96.4	97.7	101.6	101.8
24	医用	23,633	80,045	22,200	76,000	22,500	77,000	93.9	94.9	101.4	101.3
25	その他	1,784	5,912	2,300	8,000	2,400	8,500	128.9	135.3	104.3	106.3
26	▷超音波応用装置	—	67,765	—	77,000	—	87,500	—	113.6	—	113.6
27	▷電子顕微鏡	1,610	19,837	1,700	21,500	11,800	23,700	105.6	108.4	105.9	110.2
28	▷放送用VTR	1,126	9,969	800	11,300	1,000	12,500	71.0	113.4	125.0	110.6
29	▷産業用テレビ装置	74,611	18,389	69,800	19,300	80,000	22,200	93.6	105.0	114.6	115.0
30	●医用電子装置*4	—	127,233	—	133,000	—	140,000	—	104.5	—	105.3
31	●電子式卓上計算機(電卓)	63,007,821	203,077	56,000,000	163,100	61,000,000	176,000	88.9	80.3	108.9	107.9

32 *1 ①コンピュータおよび関連装置, ②電子応用装置, ③医用電子装置, ④電卓, ⑤電気計測器(表4), ⑥通信機器(表4)の合計
33 *2 NC(数値制御)装置を含む
34 *3 通産省統計に含まれる高周波電力応用装置, 放射線測定器, 医用測定器などを含まない
35 *4 医用電子機器の中の超音波診断装置は, 超音波応用装置中に一部2重計算

Key:

1. FY 80 (actual record)
2. FY 81 (estimated)
3. FY 82 (predicted)
4. FY 81/80 (%)
5. FY 82/81 (%)
6. Volume
7. Value
8. Industrial-use electronic equipment*1
9. (Total, excluding small calculators)
10. Computers and related equipment

[Key continued on following page]

APPROVED FOR RELEASE: 2007/02/09: CIA-RDP82-00850R000500080077-4

11. Digital type
12. Computer main body
13. For general use
14. For control use
15. Peripheral equipment
16. External memory facility
17. Input-output facility
18. Communications control facility
19. Terminal facility
20. Auxiliary facilities
21. Computer application facility*2
22. Applied electronics facility*3
23. X-ray facility
24. Medical use
25. Others
26. Applied ultrasonic-wave facility
27. Electron microscope
28. Broadcast-use VTR
29. Industrial use TV facility
30. Electronics equipment for medical use
31. Electronic desktop calculators (hand calculators)
32. *1 (1) Total of computer and related equipment, (2) Applied electronic equipment, (3) Electronic equipment for medical use, (4) Desk calculators, (5) Electronic measurement equipment, (6) Communications equipment (Table 4)
33. *2 Includes NC (numerical control) equipment
34. *3 Does not include high-frequency power application devices, radiation measurement equipment, or medical measurement equipment listed in the MITI tabulation
35. *4 The ultrasonic diagnostic equipment among the medical equipment is, in part, doubly entered among the applied ultrasonic equipment

16-Bit Personal Computers Presently on the Market

機種名(1)	(2)メーカ	(3) 出荷時期
YHP9845A	(4)横河ヒューレット・パッカード	(16)52年10月
PFC-15	(5)パナファコム	(17)53年9月
CEC8000	(6)中央電子	(18)56年2月
PHC-3100	(7)三洋電機	(19)56年7月
Packet68000	(8)安立電気	(20)56年9月
FACOM9450	(9)富士通	(21)56年10月
OKITAC100	(10)沖電気工業	(22)56年11月
SEIKO9500	(11)精工舎	(23)56年11月
M416	(12)ソード電算機システム	(24)56年11月
N5200	(13)日本電気	(25)56年12月
PFC-180	(14)パナファコム	(26)57年12月
MULTI16	(15)三菱電機	(27)57年4月

Key:

1. Name of unit
2. Maker
3. Shipment date
4. Yokogawa-Hewlett Packard
5. Panafacom
6. Chuo Denshi
7. Sanyo Electric
8. Adachi Denki
9. Fujitsu
10. Oki Electric Industry
11. Seikosha
12. Sode Computer System
13. Nippon Electric
14. Panafacom
15. Mitsubishi Electric
16. Oct 1977
17. Sept 1978
18. Feb 1981
19. July 1981
20. Sept 1981
21. Oct 1981
22. Nov 1981
23. Nov 1981
24. Nov 1981
25. Dec 1981
26. Dec 1982
27. Apr 1982

putting efforts into exports; exports of computers by domestic manufacturers, which barely cleared 100 billion yen in FY 81, will probably break the 200 billion mark in FY 82.

In the background of this sharp rise in computer exports from Japan may be cited the foreign countries' evaluation of the high reliability of hardware made in Japan. They have good cost performance, and these products have adequate competitive strength, so exports are expected to increase even after FY 82. On the other hand, the number of articles in Western newspapers and magazines sounding the alarm against Japanese imports warn that a too rapid increase in exports could result in trade friction. Unless steps are taken so as not to incite repercussions from countries with which trade is conducted, a narrowing of the market is unavoidable.

Medical Equipment

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 277-282

[Article by Takashi Kohagaya of the NIKKEI ELECTRONICS Business Office: "Electronics Equipment for Medical Use, Electrical Measurement Equipment, Communications Equipment"]

[Text] Languishing Domestic Demand

The medical-sector electronics market, which had been growing at a rate of 20-30 percent per year, began to see some erosion in demand, starting about the fall of 1980, and was then beset by the revision of the drug-cost standardization and consultation-fee laws on 1 June 1981. The cost of drugs was lowered by 18.6 percent. As a result, the past practice of "making good money on drugs to cover the cost of electronics equipment for medical use" was no longer feasible. Consultation fees were lowered 8.1 percent, but because of the importance placed on physicians' technique, there was no increased demand for medical-use electronics equipment. As a result, managers of medical organizations who were wondering about the future became more careful in their investments in this area. There is a particularly strong mood against the purchase of high-price products, and this practice is spreading.

X-Ray CT Battle Intensifying

The sharp growth in the ME market during the period from 1975 to 1980 was due to X-ray CT (computer-aided tomography and ultrasonic diagnostic equipment). Of the two, the faltering demand for X-ray CT as 1981 began was severe. An X-ray CT for crania [examination] costs 100 million yen, while an all-body X-ray CT costs about 200 million yen, and the paucity of purchases is causing great consequences. The number of X-ray CT facilities in this country exceeds 1,500 altogether, and there is a feeling that a state of saturation has been attained.

The production of X-ray CT in 1981 was down about 30 percent from the previous year. This was not such a large drop in actual numbers, but the reduction in price was responsible for this decrease. The unit for cranial use, which hit the market faster, was the victim of this price decrease, as was to be expected, but the all-body unit is also seeing fierce price competition.

As a result, large manufacturers such as Toshiba Corporation have started looking actively to exports as a means of bolstering this sagging market. Exports are increasing not only for the cranial unit but for the whole body unit as well, and this trend is expected to be spurred on still more during FY 82. In contrast, [the market for] X-ray diagnostic equipment has been decreasing only at a single-digit level. Since it is a very vital tool to the physician, a hard-bottom movement is taking place. It is expected that angiography by means of a simple venous injection will become possible in FY 82 through digital radiography (DR), and this is a bright subject. Starting with the new product marketed by Toshiba in March, Aloca has been planning to import and market the product of the American Technicare Company, and these moves are adding to the fierce situation in the trenches.

Export Designs for Ultrasonic Diagnostic Equipment

The ultrasonic diagnostic facility is another item for which demand has fallen. Just as with the X-ray CT, there is a feeling of saturation in the domestic situation, and there is a strong impression within the obstetrical sector that the field has been completely covered. There are a great number of manufacturers in this field; counting only the Japanese manufacturers, there are roughly 10 companies, including Toshiba, Hitachi Medico, Shimazu Seisakusho, Aloca, and Yokogawa Electric Works. In addition, latecomers in the medical-use electronic equipment area such as Mitsubishi Electric and Fujitsu are looking for an opportunity to break in. According to industry estimates, domestic production during 1981 was 18.5 billion yen, a sharp drop of 15 percent from the previous year. No great expectations are seen in this area for 1982.

On the other hand, 1981 was a good year for exports. Industry estimates place the total at about 19 billion yen, for a 70-percent rate of growth over the previous year. The Japanese linear ultrasonic facility, which scans in parallel manner with ultrasonic beams, reportedly is rated very highly throughout the world. The front runner firms, including Toshiba and Aloca, are exporting under their own brandnames, and a strategic ME export product situation is developing. In addition, latecomer Tokogawa Electric has started OEM exports (exporting under the customers' brandname) with GE (General Electric) of the United States, Tokyo Keiki with France's CGR, and Matsushita Communication Industrial with West Germany's Siemens of the linear-type ultrasonic diagnostic facility. There is a possibility that this will be followed by exports of the sector mode (in which the beam fans out just like radar) or the M mode in addition to this linear mode.

Automated biochemical analysis facilities, electrocardiographs, electroencephalographs, ICU (intensive care observation facility), and CCU (facility

for observing cardiac patients) head the list of medical equipment body measurement and observation facilities that are caught up in fierce sales competition. Of these types, electrocardiograph and electroencephalographs, which have international competitive strength, are being seriously considered for export.

Developmental competition on post-X-ray CT seems likely to become the main focal point in 1982. The top candidate is the NMR (nuclear magnetic resonance) CT. The large class is intended solely for human use; it is presently under test-production, with possible commercialization by year's end. It is appealing, in that it has a functional diagnostic capability in addition to a morphological diagnostic capability. There is also the laser scapel, which permits surgery with minimal bleeding; this is undergoing a price reduction. Also, improved surgical techniques seem to be around the corner. The large manufacturers are eyeing all these products with eagle eyes.

Electrical Measurement Equipment To Maintain Double-Digit Growth

Electrical measurement equipment (industrial measurement equipment, electrical measurement equipment, electrical instruments) seem about to maintain double-digit growth in FY 82. Even when production is estimated on the low side, there is a good possibility that the 450 billion yen level will be exceeded.

On the other hand, viewed on the basis of the calendar year, growth in electrical measurement instruments shows a somewhat slowing trend. According to Ministry of International Trade and Industry [MITI] statistics, the growth rate for 1979 (on a monetary base) was a large 17.5 percent, and it was 16.7 percent in 1980, thereby maintaining this high rate of growth. On the other hand, sales for 1981 totaled 394.9 billion yen, a low 12.6-percent rate of growth. Although it may be said that investments in conservation of energy and labor give rise to demand that has a firm base, the present situation demonstrates that the electrical measurement equipment sector is not without an edge in the face of the uncertain economy. The spotty nature of industrial instruments, electrical measurement instruments, and electrical instruments has advanced, and the good and bad types and items have been clearly delineated. Although there is no direct tie with market trends, the proof of Japan's improved status in this area can be seen in the fact that the first international instrument exposition in Japan was held in October 1981, at the Tokyo International Trade Center in Harumi, Tokyo.

Industrial Measurement Equipment at Heart of New Demand

Industrial instruments make up more than 50 percent of [all] electrical measurement equipment. This area showed a growth rate of 15 percent in 1981, displaying a rate of growth which exceeded the average of the rest of the electrical measurement equipment field.

The most noteworthy product development in industrial instruments is the growth of digital instruments. Up till the present time, the analog mode has been used because of safety factors and ease of operation, but recent advances

in the digital area have led to the possibility that the present situation will be turned around in 2-3 years. What is of great interest here is the single-loop controller, in which each loop (a loop is a unit of measurement control) has an independent control and observation function. Not only can an instrument panel be used, just as for analog instruments, but there is the added advantage that digital controls can be applied to small-scale processes in which economic control had not been able to be realized with the multiple-loop dispersed system used in the past.

This is an area which in the past had been exploited by integrated electrical manufacturers such as Toshiba Corporation and Hitachi Limited on the basis of their strength, but since the beginning of 1981, special electrical instrument manufacturers such as the Yokogawa Electric Works, Yamatake Honeywell, and Hokushin Electric Works have entered the fray, and the competition is becoming fierce. In addition, there seem to be great efforts being made to introduce optical fiber communications into the industrial instrument area. Compared to the copper cable communications mode used up to the present time, optical fiber communications will allow a spectacular increase in the number of communications that can be transmitted simultaneously, and it is superior in the matter of conserving space and resources and is not damaged by lightning; these are just some of the many advantages it possesses. At the present time, optical fiber communications is more expensive than copper cable communications, but its full-fledged introduction into the industrial instruments area should be coming along in a couple of years.

Also of note is panelless instrument installation, in which the control section and observation section are separated to facilitate observation and operations. This involves operation through display on a CRT; conservation of space is said to be the top selling point.

Looking now at the directions in demand, demand associated with renovation seems to be the mainstream in the area of private demand. Increased demand is expected because of conservation of energy practices and rationalization in the steelmaking, machinery, and power industries. In another area, there is a great desire to introduce rationalization in survival strategy in the chemical and petroleum refining industries, despite the objective situation. These industries posted good records in 1979 and 1980, but it is difficult to predict whether this situation will continue.

Direct Export of Industrial Instruments Will Grow

In the past, indirect exports made up the major part of industrial equipment trade. However, there was an increase in technology exports in 1981. The three specialty equipment manufacturers--Yokogawa Electric Works, Yamatake Honeywell, and Hokushin Electric Works--can be especially singled out for the effort they place on the export of technology to China. The number of manufacturers that engage in exports to leading countries such as in Europe and the United States is also increasing. In the particular situation of the relationship with the United States, what had once been a strictly one-way traffic from the United States to Japan has now seen technological strengths

evening up, and contracts are now being made on a nearly equal footing, as exemplified by the agreement between Hokushin Electric Works and Fisher-Porter.

Semiconductor Measurement Instruments in a Rally?

Electric measurement equipment, which ranks next to industrial equipment where volume is concerned, will probably register a double-digit rate of growth in FY 82. On the other hand, when the production figures for 1981 (calendar year) are reviewed, the growth rate was 12.9 percent, which was below that of industrial instruments, and it will be difficult to maintain the growth rates of more than 20 percent that were registered in the past.

The factor responsible for the sharp growth in electrical measurement equipment up till now has been the high growth in semiconductor testing equipment such as LSI (large-scale integrated circuits). Measurement equipment manufacturers such as Takeda Riken Industry, Ando Electric, and Minato Electronics, whose strength lies in this area, achieved spectacular growth. Their growth rate in 1981 (production value base) was 28.2 percent, which was somewhat of a letdown from the previous year's growth (43.3 percent). To be sure, the effects of the expanded market cannot be disregarded, but there can be no denying that the investment in facilities by semiconductor manufacturers was mostly a one-shot deal. However, there does seem to be a possibility of increased activity from FY 82 on, and Takeda Riken Industry and Ando Electric are racing for new and expanded plants. In addition to the above situation, these manufacturers of measurement equipment are proceeding to set up overseas production sites, accompanying the trend to locate semiconductor plants overseas.

Oscilloscopes, which make up the main part of general-use measurement equipment, posted sales in 1981 (calendar year) of 19.3 billion yen, a 10.8-percent rate of growth. A fierce price war has been raging over 10-50 MHz, which is a comparatively lowband region, and powerful manufacturers such as Hitachi Electronics and Matsushita Communications Industries are seeking to increase their share of the market. The possibility that VTR-related investments will drop considerably in FY 82 is a matter of concern. This is why each company is strengthening its export plans. In addition, a new area to be noted is optical-fiber-related measurement equipment, and the fight between Ando Electric and Adachi Electric for top position stands out.

In another direction, the market for electrical measurement equipment itself is entering a stable growth period, and no sharp rate of growth can be expected from here on. The production value in 1981 (calendar year) was 35.7 billion yen, which was a slight decrease of 0.3 percent from the preceding year. The largest market was in the area of electric power instrumentation, where there is lateral movement and some small increase. The number of home construction starts is low, and manufacturers such as Osaki Electric Industry are directing their strength to exports directed at Southeast Asia and the Middle and Near East.

Communications Equipment

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 282-283

[Article by Yoshiyuki Kitamura of the Business Office, NIHON KEIZAI SHIMBUN: "Communications Equipment"]

[Text] 10-Percent Growth in Development of Private Demand and Exports

Demand for communications equipment is increasing in an orderly manner. According to a survey by the Communications Machine Industry Association, the demand for communications equipment in FY 81 (excluding parts for communications equipment) was 1.261 trillion yen, which represented a growth of 11.6 percent over the preceding year. Demand in FY 82 is expected to grow at slightly less than the above [rate]--at about 10.1 percent, to 1,240,200,000,000 yen. When these figures are broken down into wire and wireless equipment, wire equipment (excluding parts) is expected to increase by 9.8 percent over the previous year to 761.3 billion yen, while wireless equipment is expected to grow 10.6 percent to 478.9 billion yen.

According to an interim survey by the Communications Machine Industry Association, the demand for communications equipment is expected to increase at an average rate of 10 percent in the 5-year span from FY 81 through FY 85. A rate of growth close to this 10-percent figure is expected in FY 82.

When prospective demand for FY 82 (including parts for wire communication equipment) is broken down into different categories, demand by the public and government sector, centered on the Telegraph and Telephone Public Corporation [NTT], is expected to total 522.1 billion yen, the private sector demand 428.9 billion yen, and exports 338.4 billion yen. The respective rates of growth over the preceding year are 5.0 percent, 12.0 percent, and 14.4 percent. As a result, the makeup ratio of the demand is 40.5 percent for public and government sources, 33.3 percent for private sources, and 26.2 percent for exports. The demand structure, which had been oriented mainly toward NTT, now seems to be shifting toward private demand and exports.

The demand in FY 82 for exchanges, the main item in wire communications equipment, is expected to total 251.3 billion yen, an increase of 3.5 percent over last year. The demand for exchanges has been stunted during the past few years because of the overall decrease in facilities investment by NTT. The intermediate demand prediction put out by the Communications Machine Industry Association foresees an average growth of but 6 percent for the 5-year period from FY 81 up to 1985. On the other hand, this is also an area where electronification is developing rapidly, so that even though the overall growth picture for exchanges is small, large differences in growth rates between different areas are seen.

For example, sales of electronic exchanges are expected to total 179.1 billion yen, which will be an increase of 15.5 percent. In contrast, sales of crossbar exchanges totaled 57 billion yen, a decline of 19.7 percent. The intermediate predictions assign a 14.9-percent growth rate for electronic exchanges

and a 20.4-percent decrease to crossbar exchanges. Electronic exchanges have made the shift from analog (space-divided) to digital (time-divided) exchanges; the digital (time-divided) exchanges are winning out.

As one phase of its promotion plan for INS (high-level information communication systems), NTT has been working in earnest since FY 81 to digitalize its communications network. Digital exchanges were introduced for the first time at urban-suburban exchanges in FY 81. The introduction of digital exchanges is expected to be accelerated still further in FY 82, and it is anticipated that all of NTT's purchases in the next few years will be digital exchanges. This is a little earlier than had been planned initially. Along with this trend to digitalization, there are eye-opening developments in optical fiber communications. NTT already had started commercialization tests with 32-M bit/sec and 100-M bit/sec medium and small capacity modes in December 1981. Thought is being given to speeding up the commercialization of the 400-M bit/sec mode that is presently being tested.

The demand for telephone application facilities has continued well. Demand in FY 82 is expected to total 151.6 billion yen, which will be 13.6 percent over the figure for the previous year, and push-button telephones are doing particularly well. The demand for push-button telephones is expected to reach 108.5 billion yen. This will be an increase of 14.7 percent over last year. On the other hand, compared to the rate of growth of 29.2 percent recorded in FY 81, there is no denying that this rate of growth is slowing down.

Demand for facsimiles remains good. The demand for FY 82 is predicted to be 139.6 billion yen, an increase of 29.5 percent over the previous year. According to the intermediate survey of the Communications Machine Industry Association, an average rate of growth of 25 percent per year is predicted for the 5-year period from FY 81 through FY 85. This good performance on the part of facsimiles is partly a result of the OA boom, which has created a sharp increase in demand for facsimiles for business application, and partly a result of increased exports. Japan has completely overpowered other countries in production of facsimiles, and it is already being regarded as the world's supply source for them. This situation may become even stronger; it certainly will not abate.

The demand in FY 82 for carrier equipment is expected to total 164.3 billion yen, for a 5.3-percent rate of increase. Within this category, signals transmission equipment is seeing relatively orderly growth, along with the advances in digitalization of communications networks, and sales in this area are expected to reach 50.3 billion yen--an 11.0-percent rate of growth over the preceding year.

The breakdown in FY 82 demand for radio communications equipment includes fixed office communications equipment, totaling 152 billion yen, which will be an increase of 9.4 percent over the previous year, and mobile office communications equipment, totaling 108.9 billion yen, a 13.9-percent increase over last year. Demand for mobile equipment is expected to be greater in FY 82, but the results of the intermediate-demand prediction show the difference between the two not to be as large. The field of fixed office communications equipment is expected to grow an average 9.3 percent per year

Table 4. Production Estimates for Industrial-Use Electronics Equipment
(Monetary Unit: 1 Million Yen)

		55年度 (実績)	56年度 (推定)	57年度 (予測)	56/55年度 (%)	57/56年度 (%)
		金額	金額	金額	金額	金額
6	●電気計測器	364,002	408,500	454,000	112.2	111.1
7	▷電気計器(電力計, メータなど)	36,677	37,500	38,000	102.2	101.3
8	▷電気測定器	143,260	158,000	172,000	110.3	108.9
9	電圧・電流・電力測定器	10,824	12,100	13,500	111.8	111.6
10	(ディジタル・マルチメータなど)					
11	回路計(サーキット・テスタ)	5,566	5,800	6,000	104.2	103.4
12	周波数時間測定装置(周波数カウンタなど)	4,262	4,500	4,800	105.6	106.7
13	波形測定器(オシロスコープなど)	30,219	33,000	36,000	109.2	109.1
14	電子管・半導体・回路素子材料測定器	26,031	31,000	36,000	119.1	116.1
15	(LSIテスタ, インピーダンス・メータなど)					
16	伝送特性・電波測定器	6,519	7,200	7,800	110.4	108.3
17	(選択レベル計, 電界強度測定器など)					
18	総合測定装置(PCM誤り率測定装置など)	5,318	6,900	7,900	129.7	114.4
19	測定用補助機器(信号発生器, レコードなど)	31,436	34,000	36,000	108.2	105.9
20	その他の電気測定器	23,085	23,500	24,000	101.8	102.1
21	▷工業計器	184,065	213,000	244,000	115.7	114.6
22	プロセス用工業計器(発信器, 受信器など)	88,305	100,000	112,000	113.2	112.0
23	その他の工業計器	68,421	80,000	93,000	116.9	116.3
24	データ処理装置	27,339	33,000	39,000	120.7	118.1
25	●通信機器	1,008,700	1,126,100	1,240,200	111.6	110.1
26	▷有線通信機器	616,600	693,200	761,300	112.4	109.8
27	電話機	39,900	40,400	41,200	101.3	102.0
28	交換器	226,300	242,700	251,300	107.2	103.5
29	電子交換機	131,100	155,100	179,100	118.3	115.5
30	クロスバ交換機	77,500	71,000	57,000	91.6	80.3
31	その他	17,700	16,600	15,200	93.8	91.6
32	電話応用装置	108,700	133,900	151,600	123.2	113.2
33	電話付属装置	86,500	111,000	126,800	128.3	114.2
34	インタホン	12,100	12,300	13,500	101.7	109.8
35	その他	10,100	10,600	11,300	105.0	106.6
36	電信装置	10,400	12,400	13,300	119.2	107.3
37	ファクシミリ	84,700	107,800	139,600	127.3	129.5
38	搬送装置	146,600	156,000	164,300	106.4	105.3
39	信号伝送装置	36,700	45,300	50,300	123.4	111.0
40	広帯域端局装置	63,300	60,000	60,000	94.8	100.0
41	搬送電信端局装置	25,200	28,100	30,300	111.5	107.8
42	その他	21,300	22,600	23,700	106.1	104.9
43	▷無線通信機器	392,100	432,900	478,900	110.4	110.6
44	放送装置	50,900	63,800	70,000	125.3	109.7
45	ラジオ放送機器	4,600	6,800	6,000	147.8	88.2
46	テレビジョン放送機器	46,300	57,000	64,000	123.1	112.3
47	無線通信装置	215,400	234,600	260,900	108.9	111.2
48	固定局通信装置	129,600	139,000	152,000	107.3	109.4
49	移動局通信装置	85,800	95,600	108,900	111.4	113.9
50	無線応用装置	125,800	134,500	148,000	106.9	110.0
51	レーダ装置	34,800	40,500	45,000	116.4	111.1
52	無線位置測定装置	19,400	22,000	25,000	113.4	113.6
53	その他	71,600	72,000	78,000	100.6	108.3

54 注) 通信機器の実績, 推定, 予測は通信機械工業会(無線通信機器)の調べによる。
有線通信機器には有線通信機器用部品を含まない

[Key on following page]

Key:

1. FY 80 (actual record)
2. FY 81 (estimated)
3. FY 82 (predicted)
4. FY 81/80 (%)
5. FY 82/81 (%) 5a. Value
6. Electrical measurement equipment
7. Electric instruments (power gages, meters)
8. Electrical measurement equipment
9. Voltmeters, ammeters, power measurement meters
10. (such as digital multimeters)
11. Circuit meters (circuit testers)
12. Frequency time measurement equipment (such as frequency counters)
13. Waveform measuring equipment (such as oscilloscopes)
14. Electron tubes, semiconductors, circuit element material testing equipment
15. such as LSI testers, impedance meters
16. Transmission characteristics, radiowave-measuring equipment
17. (such as selection level meters, electric field strength testers)
18. Total measurement facility (such as PCM error rate measurement devices)
19. Auxiliary measurement equipment (such as signal generators, records)
20. Other electrical measurement equipment
21. Industrial instruments
22. Process-use industrial instruments (such as transceivers, receivers)
23. Other industrial instrument
24. Data treatment equipment
25. Communications equipment
26. Wire communications equipment
27. Telephone
28. Exchange
29. Electronic exchange
30. Crossbar exchange
31. Others
32. Telephone application facility
33. Telephone accessory facility
34. Interphone
35. Others
36. Telegraph facility
37. Facsimile
38. Carrier facility
39. Signal transmission facility
40. Broadband region terminal facility
41. Carrier telegraph terminal facility
42. Others
43. Radio communications equipment
44. Broadcast facility
45. Radio transmission equipment
46. TV transmission equipment
47. Radio communications equipment
48. Fixed office communications facility
49. Mobile office communications facility
50. Applied radio facility
51. Radar facility
52. Radio position locator
53. Others
54. (Note) Compiled from actual records and estimates in communications equipment, and from predictions by survey of the Communications Machine Industry Association (radio communications equipment). Parts are not included in wire communications equipment.

through FY 85, and mobile office communications equipment to grow an average of 10.8 percent for the same period.

Effects of Trade Friction an Uncertain Area

The factor which must be given the most attention in the forecasts for FY 82 is trade friction. As mentioned at the start, the demand structure for communications equipment is shifting from one controlled mainly by NTT's needs to the areas of private use and exports. The forecasts discussed to this stage assign considerable weight to exports. Because of this, if the United States, which is [our] primary export market, puts import restrictions against Japanese products into effect, a decrease in overall demand can be expected.

There is a very good possibility that this situation may materialize. Revision of the communications law is being debated in the United States at the present time, but this law incorporates the principle of reciprocity, and should this law be enacted, Japan's communications equipment industry would become subject to a considerable impact which could not be avoided. Should trade friction between Japan and the United States or Europe intensify in the future, there may be greater criticism of communications equipment made in Japan. In addition, there is a need to look carefully at the effects of the antimonopoly decision decreed against AT&T in the United States. The changes in the market structure resulting from the separation of the telephone business company at AT&T should have a major impact on Japan's communications equipment world.

Growth of Parts Industry

Tokyo NIKKEI ELECTRONICS in Japanese 12 Apr 82 pp 284-292

[Article by Junichi Ogino and Takahide Nonaka of the NIHON KEIZAI Editorial Department: "Electronic Parts Industry's Broadening Field of Activity"]

[Text] A Year When Overall Technological Strength Is Questioned

The electronic parts industry, which maintained a high growth rate of about 20 percent for 2 successive years, has shown signs of distress at the beginning of FY 82. The role of prime mover for this high growth rate had been played by VTR, but it now is suffering from an accumulation of inventory, while audio products have been in a very depressed state since early August of last year (1981), so every manufacturer has had to reduce production, and all of this is contributing to this slowdown in growth.

Audio, VTR, and TV are large demand sources for electronic parts. This is why the parts industry is affected when the above industries slow down. Orders for parts used in audio equipment began to slow down last fall. Orders received and production during the 4 [as printed] months from November 1981 to April 1982 decreased 10-20 percent from the preceding year. This was followed by production readjustments in other circuit parts in January

1982. IC (integrated circuit) is no exception, and the uncertain future has resulted in a reassessment of plans.

Every company is displaying considerable discretion in estimating its production for FY 82. If this were an ordinary year, inventory readjustments would be completed along about April, after which demand would pick up again. This year, however, there is a feeling that a rise in demand will be delayed. The audio recession seems destined to last for a long period, while VTR, on which there are so many high hopes, cannot be expected to maintain the rapid growth it has undergone to date. It has been pointed out that there presently is a delay in the time of acquisition of single parts by export.

On the other hand, the situation is not all bad. VTR, which contains more parts than color TV, will be expected to grow at least 25 percent. Miniature and handy cassettes (with radios) may also show great growth. In addition to these items of electronic equipment for private use, the demand is good for parts for industrial and business equipment use. Various automated-control items of equipment, automobiles, and so-called OA equipment come under this category. The active market is broadening, as far as the electronic parts industry is concerned. It even has been said that "there are no areas in which we are not concerned" (Matsushita Electronic Parts).

This trend emerged a few years ago. The results of efforts expended by different companies are already showing up as differences in the performance of the companies. Other industries expect the electronic parts industry to be a source not just of spare parts but also of information about electronics, including electronic circuits. As a result, it is only natural that products from the parts industry will come out in block form, unitized form, and systematized form. In addition, there may be many instances similar to that in which manufacture of magnetic condensers entered the field of chip resistors. Parts manufacturers have entered an era in which their true technological strength, planning strength, and developmental strength will come into question.

General Electronic Parts: Further Development in Small, Lightweight, Chip-like Parts

As shown in Figure 3, general electric parts have a high dependency rate on electronic equipment for private use. Demand for parts will be stifled as long as audio equipment does not recover. At the same time, there are about 1,600 parts which go into a single VTR unit. This is a large number, compared to the 650 parts for a color TV set and 370 parts for a black and white TV set. The growth rate of VTR will moderate. At the same time, there will be increased use of IC (including hybrid IC use). Performances have been standardized, facilitating conversion to IC. As a result, in the long run there will be a decrease in the number of electronic parts requiring leads.

On the other hand, the number of chip parts with no IC or leads will increase. This trend is the same for other electronic parts. In the past, chip parts

were used for the purpose of miniaturization, lightness in weight, or thinness. This enabled switches, connectors, and speakers to be made smaller and lighter in weight. This means conservation of materials. But that will not be the situation from here on. Chip parts will be used to automate assembly. This is because a part with leads (automatic inserter) is less readily automated than a chip part (automated installer) with no leads, and parts with the same shape are more easily automated. This is why manufacturers say they would like to convert not only resistors, condensers, and coils to chip parts but other parts as well. A fierce conflict may be forthcoming between the angular type and the circular type, where these chip parts are concerned.

In addition, progress is being made in the automation of equipment adjustment. Base plates with printed resistors are already being used in part of the VTR production lines. There is no longer a need to use semifixed resistors or condensers.

Differences Between Businesses in Circuit Parts Industry Is Widening

The trend to chips in circuit parts is very marked. There will also be active demand for composite circuit parts such as printed resistors and LCR (coil-condenser-resistor) blocks. Large parts manufacturers will push their companies' technological and fiscal strengths in order to go into mass production. On the other hand, medium-size and smaller manufacturers may not be able to engineer such technological innovations, and differences in performance are expected to widen even more.

The reduction in the price of metalfoil-type fixed resistors may become a subject of concern in the area of resistors. Condensers in the form of aluminum electrolytic condensers, tantalum electrolytic condensers, and magnetic condensers are attacking the market, exploiting their small size and large capacity as weapons. Semifixed resistors and condensers for use with trimmers (fine adjustment), which are finding an expanding market in cameras, are expected to become still smaller and find an increasing market. On the other hand, the trend to the aforementioned adjustment automation cannot be ignored.

Since approximately last November, coils have fallen into a state of reduced production--20 percent below the same period in the previous year. No quick recovery is anticipated. More multiple products with small volume will be coming into play from here on, and the number of composite products may increase. There are also expectations for high-Q and high-inductance chip coils. Leadless transformers may also make their appearance. Switching power sources will proliferate, with the greater use of microcomputers. On the other hand, competition will be fierce.

Parts in Which There Is Clear Demarcation Between Private and Industrial Use

Connectors probably are the item for which the greatest increase in demand may be expected. This is because of the prospects of a large increase in demand for use with business equipment and industrial equipment. Small connectors with 2-mm pitch may also increase. As a result of all-out practices

in line with the "departure from money" and "conservation of funds" policies [brought on by] the high cost of money in 1980, it has become possible to produce connectors at a lower cost than the United States, which is the leading country where connectors are concerned, and even exports are now feasible. A sizable demand for connectors for use with optical fibers has finally started to be created.

Light-emitting diodes using illuminating-type push switches and thin keyboard switches are proliferating in the area of switches. Switches with sensor capability and remote control capability are also increasing. Crystal oscillators saw great growth in FY 81 due to the demand for VTR, but this market may taper off in FY 82. There will also be a lowering of prices. On the other hand, much smaller crystal oscillators, made possible by cutting innovations, which still retain the same properties of the AT plates of the past, and small units that oscillate down to very low frequencies are new products which are drawing attention. Miniature tuners and tuners tuned in on American broadcast satellites are also attracting interest.

Although paper phenol baseplates are undergoing stunted growth in the area of printed circuit baseplates, glass epoxy plates and composite materials will probably become popular. The use of chip parts is increasing baseplates with both sides usable in the area of private use; the use of hard plates that are less than 1.0 mm thick, thus reducing size and weight, is responsible for this trend. At the same time, pattern pitch has been reduced through high-density installations. Flexible plates are also increasing. Those finding practical use have made the transition from the 2-4 layer type used in the past to a 4-6 layer type. Multiple-type small volume products are increasing for use with microcomputers. Paper phenol types are used here.

Magnetic Heads Expected To Be Used Industrially

Reflecting the depressed state of audio, no high growth rate can be anticipated for sound equipment. Speakers are awaiting market recovery in radio-attached cassettes. At the same time, growth in small-type speakers, the so-called solid speakers and microspeakers, is expected. Magnetic heads for use with VTR, floppy discs, card readers, or digital audio tapes will grow. Production of projection heads for VTR has been attempted within each company; to date, Alps Electric and Tokyo Electro-Chemical Industry have initiated mass production, and Matsushita Electronic Parts also sells this product.

Magnetic Tape for VTR in Good Shape

Magnetic tape is in a good situation both for audio use and for VTR use, and its use with floppy discs is awaited. In the particular area of tapes for VTR use, each company is setting up increased production systems. Tokyo Electro-Chemical Industry plans to have monthly production of 10 million reels by the end of the year, followed by Fuji Photographic Film, Hitachi Maxell, Sony, Sumitomo-3M, Matsushita Electronic Parts, and Japan Victor--all of which are planning to increase production. This may all be accompanied by a fierce price-reduction war.

Parts for Facsimiles and Relays in Good Shape for Communications Use

With the electronification of exchanges, [the demand for] parts for crossbar exchanges is continuing to decrease. At the same time, telephone demand is saturated, and no large increase can be expected in the entire area of wire-communication parts. On the other hand, parts for facsimiles and control use relays are in good shape. Be that as it may, the market competition in control use relays is quite fierce.

Liquid-Crystal Elements for Character Display Growing

Liquid-crystal display elements, which were newly added to the statistics in 1981, have presently developed into a 3 billion yen per month market. The principal applications are in small calculators and watches, but the market in the toy and automotive sectors is expanding. Character-display application is showing particularly good growth, and growth on the order of 15 percent is expected this year.

Electron Tubes: High-Precision Display Tubes in Good Demand

Braun tubes, which account for 75 percent of electron tubes, are in a declining trend. The sideways movement of the color TV and black-and-white TV market and the trade friction with the United States and Europe are of concern here. On the other hand, there are great expectations for high-precision-color Braun tubes for terminal monitor use in office equipment and computers. In addition, small black-and-white Braun tubes for VTR image monitors and TV camera viewfinders are expected to witness growth.

A continued high rate of growth is foreseen for picture tubes, which have sustained good growth in the past. The growth rate of VTR cameras for household use is still on the order of 1 percent, and this is a product of the future. There will be some increase in solid picture elements, but they are not expected to take over the principal role in FY 82. In addition, the market for fluorescent display tubes is expanding. On the other hand, there should not be too much optimism. This is because competitors in the form of liquid-crystal display elements, light-emitting diodes, and electroluminescent tubes lurk in the wings.

Semiconductor Elements: Light Elements and Power Elements to Grow

Silicon transistors, which had undergone a stringent supply-and-demand situation from the end of FY 80 through FY 81, went through a period of large growth last year. It is a rare occasion in recent years for semiconductor elements to show greater growth than IC. This was the result of the greater than expected growth in VTR, which uses transistors. In the past, VTR was forever changing models in order to improve performance, and mass production was barely keeping up, as a result of which the conversion of circuitry to IC could not keep up. The net effect was that many separate electronic parts, including transistors, were used. As growth in VTR moderates from here on, conversion to IC may proceed. When this situation is considered, there is no doubt that the growth rate in transistors will slow down. In addition, the

audio recession has created an oversupply situation. A major adjustment in production schedules has been in progress since the end of last year. On the other hand, new markets such as digital audio can be expected to develop. There may be increase in the minimold type, among the package forms.

In addition, good growth is predicted for power MOS FET in the area of motor control. Demand [for MOS FET] as a switching power source will be expected to grow still more.

Photo diodes may be expected to continue their growth in the optical area. However, waves are beginning to appear. This is because of the fashion nature of display elements. When this possibility is considered, it may be more prudent to expect laterally directed strength rather than outright growth. The GaAlAs visible light semiconductor will develop real strength in the demand for digital audio display use. Light-receiving elements also are in good shape.

The market for converter use for American satellite broadcasts is increasing where GaAs FET is concerned. Japan has market competitive strength in this area. It is expected to find use as a tuner for color TV. According to Sumitomo Electrical Industry, growth of more than 50 percent in GaAs baseplates for FET use is predicted. The epitaxial-layer attachment type is the mainstream at the present time. It is felt that methods of producing FET by ion injection will increase in the future.

Although the volume is still small, GaAs-hole elements will find greater demand as motor rotation control sensors. InSb-hole elements are numerous in this area. Amorphous silica is used not only in solar cells but as light-sensitive bodies in duplicating equipment, and production is increasing. In addition, various types of semiconductor sensors, including thermisters and varistors, are expected to grow.

Integrated Circuits (IC): MOS Is Undergoing Large Price Reduction

IC (integrated circuit), which has sometimes been called the new "bread for industry," will probably maintain good growth. However, it is not without some uneasy problems. The Japanese-American semiconductor war, which for the past year or two had been in somewhat of a state of peace, reerupted once more at the start of this year. The SIA (American Semiconductor Industry Association) has been spearheading anti-Japanese criticism, which is increasing day by day. The point is brought out that the 64-kilobit dynamic RAM has captured 70 percent of the American market. "It is senseless to argue over the market share at sample time" (Japan Electron Machine Industry Association) is part of the rebuttal being offered, but this appears to be just a twitching of the nose of this LSI trade war. In addition, there is the uneasy area that will increase if the American market does not recover from the recession it is in. The recession in the audio industry is creating uneasiness in the domestic market.

MOS, which makes up the greater portion of IC, is undergoing severe price reductions. This area will register roughly 30-percent growth where production units are concerned, while monetary value will increase but 10 percent.

This rate of growth is certainly not very large. In contrast, bipolar and analog IC may show growth of more than 20 percent. At the same time, hybrid IC is expected to see stable growth of thick film for use in VTR.

Japanese-American Trade Friction Rekindled

Even those stanch Japanese leading manufacturers of IC pale at the most recent escalation in the Japanese-American trade friction revolving about IC. Even very high officials of the American Government are complaining to Congress at various hearings about the subsidy administration of the Japanese Government. The Ministry of International Trade and Industry, which is concerned about further intensification of this friction, sent out an unusual memo to the heads of Hitachi Limited, Fujitsu, Toshiba Corporation, Mitsubishi Electric, and Oki Electric Industry to "be careful of any export practices that might lead to complaints of dumping."

The "prime cause" for this situation has been held up to be the 64-kilobit RAM which Hitachi has been producing at the rate of 1 million per month since April, while Fujitsu, Nippon Electric, and Toshiba expect to achieve this production level of 1 million a month by the end of this year. Furthermore, each company is deeply troubled because this production is intended for export to the United States to serve as strategic goods.

According to IC market predictions, American market trends will be an important key. Japan's IC exports last year (January-December 1981) totaled 164.2 billion yen (Figure 4, Treasury Ministry customs statistics). North America accounted for 57.4 billion yen, or 40 percent of the total. The American market, which is the mainstay of these exports, has "seen a continuation of rainy weather ever since the latter half of last year, and there have been only a limited number of clear days." This is a distressing situation. The orders-versus-shipment ratio (the fraction of outstanding orders versus shipments per month) registered a sharp decrease from 1.02 in June of last year to 0.97 in the following month of July, but since then this figure has remained above 1.0. Many American manufacturers have reduced income and profits. This is one of the factors responsible for the anti-Japanese criticism.

One of the effective measures for resolving this friction is the mutual entry into each other's country through the construction of plants. The Japanese already have seen Nippon Electric, Hitachi, Toshiba, and Fujitsu construct and operate plants on the American mainland. The volume of this on-site production is presently increasing. Each of these companies plans to initiate 64-kilobit RAM production sometime this year. On the other side of the picture, the Americans have been represented by TI (Texas Instruments), which since 1968 has constructed three semiconductor plants in Japan, while Motorola entered into a joint company establishment with Toko. In addition, Fairchild has formally announced plans to build an IC plant at Isahaya City, Nagasaki Prefecture. Motorola is planning to construct a new plant in the Kyushu area, while Intel is planning construction at the Tsukuba Research and Academic City, and plant construction has become that much more active.

The purpose of this entry into Japan on the part of American manufacturers is to utilize Japan's business resources and expansion in sales through direct entry into the market. Every one of these companies is planning to produce the latest VLSI products at these Japanese plants.

To be sure, this entry of American manufacturers into Japan is a source of wonderment to the Japanese, as this signifies that a market battle is to be waged on one's own ground. Furthermore, as the VLSI age is actually about to be entered, the first assault product, the 64-kilobit RAM, will play the principal role on offense and defense. Japanese manufacturers need to grasp market trends accurately, lay detailed product policies, and develop marketing strength so as to gain consumers at a level far beyond what was needed in the past. In this manner, the response to internationalization is greeting a new stage.

CMOS Drawing Attention as Low-Power-Consumption Item

CMOS [complementary metal-oxide semiconductor] becomes the subject matter when IC is viewed from the standpoint of process technology. This is because of its low power consumption. When a plastic package is used for memory, the heat release is responsible for more than 800-mW power consumption per chip. Among the static type, the 64-kilobit nMOS approaches this limit. Even ROM [read-only memory] will come close to this limit where the 256 kilobit is involved; this is up to 128 kilobit for EPROM [erasable and electrically programmable read-only memory]. In this manner, as the degree of integration goes up, the power consumed will also increase if the same system is used, and plastic packages will become no longer usable. This is why the use of CMOS for peripheral circuits is expected to be one way to lower power consumption.

The same situation exists in the area of logic circuits. In addition, design is facilitated with CMOS for logic circuits, and CMOS has the added advantage of ease of use. This is why CMOS is expected to assume a mainstream role in large logic circuits, with the exception of those for high-speed use and for sole special-use circuits. CMOS will also increase in the area of analog and digital hybrid chips.

Investment in Facilities To Total 300 Billion Yen

Even though there is uneasiness over the recognition of the trade friction, domestic IC manufacturers are projecting high growth rate as before. Demand is expected from microcomputers, IC memory, analog IC for VTR use, and D-A converters for digital audio. IC memory is the prime mover in this market. Including the 64-kilobit RAM and EPROM, approximately a 30-percent growth is expected overall. At the present time, the 4-bit and 8-bit products are the mainstream of microcomputers. Mass production of the 16-bit will go onstream. The 32-bit microcomputer may soon become available. Sharp reported that its 4-bit microcomputer outperformed its small desk calculators last year. Microcomputers are increasing in volume through their combination with sensors. Not only control equipment, automobiles, and household electric appliances but an unlimited number of areas of applications is available. It is expected

that independent product development and soft development will become active in these areas in efforts to reverse [the situation of] American superiority.

There is great fervor for investment in facilities in order to meet these expected demands. Nippon Electric expects to increase its investment in facilities by 10 percent or more, from the 38 billion yen in FY 81 to 42 billion yen. A large fraction of this sum is destined to be put into a new production line at the Sagamigahara plant. There also will be sizable investment in the Nippon Electric plants in Kyushu and Yamagata. Hitachi Limited will invest 35 billion yen, which represents a 25-percent increase over last year. This plan involves the area under the main plant's jurisdiction, and if the five subsidiaries, including Nikkan Electronics and Aoume Electronics, are included, this investment will total 46 billion yen--a 20-percent increase over last year. This company intends to hold secure its position as the world's top manufacturer of 64-kilobit RAM.

Toshiba is also planning a large investment. The Oita plant not only is the stronghold for the static-type [RAM] but also has increased production of the dynamic-type RAM, and it plans to produce 1 million units a month by the end of the year. It will market a product of 100 ns access time. This effort is being made to recover ground lost as the result of [the firm's] late entry. In addition, it plans to invest 20 billion yen in its "VLSI development facility" (provisional name) and enter into test production of the 1-M bit RAM next summer.

Many of the other manufacturers, such as Fujitsu, Mitsubishi, Matsushita Electronic Industries, Tokyo Sanyo Electric, and Oki Electric Industry, are also planning investments that will exceed last year's levels. When the Sony, Pioneer, Nippon Gakki, Citizens Watch, Suwa Seikosha, Leco, Nippon Denso, Clarion, and Shin Nippon Musen semiconductor manufacturers for domestic consumption and Toko, Sanken Electric, Origin Electric, Shin Dengen Kogyo, and Fuji Electric are added, the total will exceed 300 billion yen.

Total production in FY 81 for semiconductor elements and IC was 1,128,600,000,000 yen. The investment in facilities that year was more than 200 billion yen. This investment was roughly 20 percent of total sales. Production is expected to total 1.3 trillion yen in FY 82, and there will be investment of 300 billion yen. This is 23 percent of production. Research and development funds are in addition to this investment. If investments continue at this rate, they will soon be of a magnitude to compete with those of the semiconductor industry. There is ample grounds for calling these investments "money-eating bugs."

Single Crystal Si to 530 Tons

High-purity semiconductor-use Si has maintained its high rate of growth of nearly 40 percent since 1978. Japan's single-crystal production last year (January-December 1981) increased 32 percent over the previous year to 444 t (tons), according to the Silicon Subsection of the New Metals Association, and this year's total may increase 19 percent to 530 t (tons). The production of polysilicon was last year 576 t, which was an increase of 23 percent over the previous year; an increase of 4 percent to 600 t is expected this year.

Japan's consumption of polycrystalline material is expected to be 1,000 t this year, an amount greater than the consumption in the United States (excluding IBM and TI). Despite this situation, Japan's growth in polycrystalline silicon is slowing down. This is because, ever since high-cost energy took over, only one silicon company specializing in high-grade material has increased its production facilities, and the single-crystal makers other than its parent company (Osaka Titanium Company, Nippon Silicon) have adopted a policy of making up their shortages by imports from the Hemlock Company of the United States and the Wocker Company of West Germany.

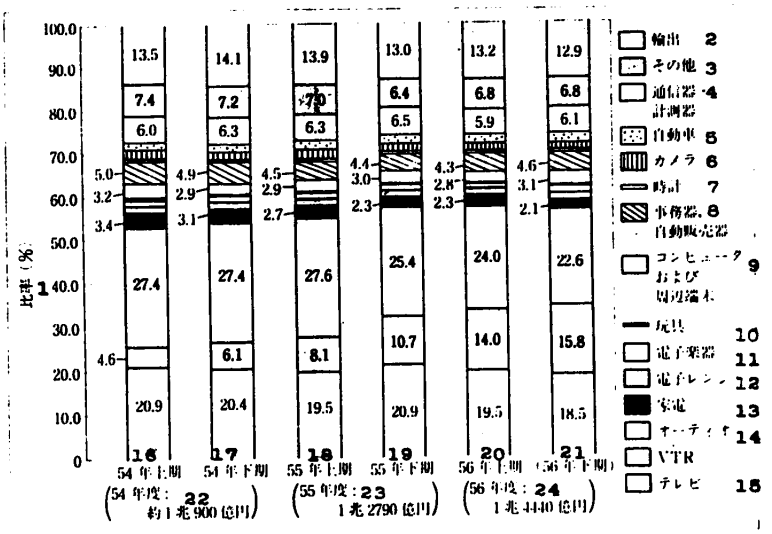

Figure 3. Shipment-Makeup Ratio According to Application of General Electronic Parts

This figure was compiled using the results of the Japan Electron Machine Industry Association's questionnaire survey. This figure does not include wire communications parts or magnetic tapes.

Key:

1. Ratio
2. Export
3. Others
4. Communication, equipment, measurement equipment
5. Automobiles
6. Cameras
7. Watches
8. Office equipment, automated sales equipment
9. Computers and peripheral terminals
10. Toys
11. Electronic instruments
12. Electronic ranges
13. Household electric appliances
14. Audio
15. TV
16. First half of 1979
17. Second half of 1979
18. First half of 1980
19. Second half of 1980
20. First half of 1981
21. Second half of 1981
22. (FY 79: about 1.9 trillion yen)
23. (FY 80: about 1.279 trillion yen)
24. (FY 81: about 1.44 trillion yen)

Table 5 (a). Estimated Production of Electronic Parts*(1)
(Number Unit: 1,000 Pieces; Monetary Unit: 1 Million Yen)

		1 55 年度(実績)		2 56 年度(一部推定)		3 57 年度(予測)		56/55 年度(%)		57/56 年度(%)	
		数量	金額	数量	金額	数量	金額	数量	金額	数量	金額
8	電子部品合計	—	2,813,295	—	3,374,430	—	3,804,280	—	119.9	—	112.7
9	○一般電子部品	—	1,504,317	—	1,783,360	—	2,011,470	—	118.5	—	112.8
10	有線通信機器用部品	149,755	32,966	—	57,060	—	58,620	—	107.7	—	102.7
11	▷ヘッドおよび偏向ヨーク	1,394	1,124	1,350	1,080	1,280	1,020	96.8	96.1	94.8	94.4
12	▷ソケットおよびコネクタ	4,056	782	6,500	780	7,800	800	160.3	99.7	120.0	102.6
13	▷リレー	143,159	47,694	192,000	51,400	235,500	53,500	134.1	107.8	122.7	104.1
14	マイヤースプリングリレー	13,294	13,586	12,000	12,500	10,500	11,500	90.3	92.0	87.5	92.0
15	その他のリレー	129,865	34,108	180,000	38,900	225,000	42,000	138.6	114.0	125.0	108.0
16	▷電子応用装置	1,146	3,366	1,370	3,800	1,100	3,300	119.5	112.9	80.3	86.8
17	受動部品		691,961		778,300		841,750		112.5		108.2
18	▷抵抗器	36,963,058	179,246	45,437,700	210,290	51,174,000	226,350	122.9	117.3	112.6	107.6
19	可変抵抗器	2,378,938	100,367	2,882,700	117,600	3,119,000	124,650	121.2	116.9	108.2	106.0
20	炭素系可変抵抗器	2,000,543	81,188	2,450,000	95,000	2,646,000	99,750	122.5	117.0	108.0	105.0
21	精密可変抵抗器	25,213	3,754	22,700	3,700	22,000	3,700	90.0	98.6	96.9	100.0
22	その他	353,182	15,625	410,000	18,900	451,000	21,200	116.1	121.0	110.0	112.2
23	固定抵抗器	34,584,120	78,879	42,555,000	92,690	48,055,000	101,700	123.0	117.8	112.9	109.7
24	炭素皮膜固定抵抗器	30,255,000	39,645	36,900,000	45,700	41,330,000	49,400	122.0	115.3	112.0	108.1
25	炭素体固定抵抗器	1,588,018	3,499	1,470,500	3,160	1,250,000	2,600	92.6	90.3	85.0	82.3
26	金属皮膜固定抵抗器*2	1,943,883	13,255	2,400,000	15,600	2,850,000	17,200	123.5	117.7	118.8	110.3
27	精密固定抵抗器	147,078	6,048	156,000	6,400	162,000	6,400	106.1	105.8	103.8	100.0
28	ネットワーク抵抗器	(40,880	799)	243,000	4,630	300,000	5,400	(591.4	579.5)	123.5	116.6
29	その他	609,261	15,433	1,385,500	17,200	2,163,000	20,700	227.4	111.4	156.1	120.3
30	▷コンデンサ	32,448,180	281,674	37,917,000	302,790	42,883,000	323,300	116.9	107.5	113.1	106.8
31	可変蓄電器	351,318	16,210	352,000	15,000	353,000	11,000	100.2	92.5	100.3	93.3
32	固定蓄電器	32,096,862	265,464	37,565,000	287,790	42,530,000	309,300	117.0	108.4	113.2	107.5
33	磁器電器*3	54,160	8,299	33,000	5,000	22,000	3,200	60.9	60.2	66.7	64.0
34	アルミ電解蓄電器	8,565,125	103,550	10,972,000	123,000	12,600,000	135,300	128.1	118.8	114.8	110.0
35	タンク電解蓄電器	1,330,903	39,753	1,300,000	35,000	1,365,000	36,000	97.7	88.0	105.0	102.9
36	磁器蓄電器	18,381,350	72,733	21,400,000	81,500	24,600,000	91,000	116.4	112.1	115.0	111.7
37	有機フィルム蓄電器	3,472,813	34,361	3,660,000	38,190	3,770,000	39,000	105.4	111.1	103.0	102.1
38	その他	292,511	6,768	200,000	5,100	173,000	4,800	68.4	75.4	86.5	94.1
39	▷複合部品*5	476,705	24,273	542,000	35,000	600,000	42,000	113.7	144.2	110.7	120.0
40	▷変成器（除輪をのぞく）	1,666,090	206,768	1,857,800	230,220	2,028,000	250,100	111.5	111.3	109.2	108.6
41	中間周波変成器および高周波変成器	1,026,564	30,169	1,050,600	31,820	1,100,000	34,000	102.3	105.5	104.7	106.9
42	入力変成器（トランジスタ用変調変成器をのぞく）	70,325	7,139	69,200	7,100	72,000	7,500	98.4	99.5	104.0	105.6
43	出力変成器	36,566	9,267	34,200	7,900	31,000	7,000	93.5	85.2	90.6	88.6
44	電源変圧器	104,986	65,585	113,600	76,000	125,000	83,600	108.2	115.9	110.0	110.0
45	その他	427,649	94,604	590,200	107,400	700,000	118,000	138.0	113.5	118.6	109.9

[Table continued on following page]

46	音響部品	—	168,445	—	175,300		178,000		104.1		101.5
47	▷スピーカ	171,133	77,149	159,000	67,000	155,000	64,000	92.9	86.8	97.5	95.5
48	口径92mm以下のもの	72,928	16,897	72,000	15,000	70,000	14,000	98.7	88.8	97.2	93.3
49	口径92mmを超えるもの	98,205	60,252	87,000	52,000	85,000	50,000	88.6	86.3	97.7	96.2
50	▷マイクロホン	22,195	19,710	22,000	20,100	22,000	20,000	99.1	102.0	100.0	99.5
51	▷ステレオ·ヘッドホン	7,664	14,072	12,700	18,800	14,600	20,000	165.7	133.6	115.0	106.1
52	▷ピックアップ	10,246	10,059	10,200	9,400	10,000	9,000	99.6	93.4	98.0	95.7
53	▷磁気ヘッド	141,874	17,455	160,200	60,000	185,000	65,000	112.9	126.4	115.5	108.3
54	機構部品	—	348,198	—	418,200	—	456,600		120.1		109.2
55	▷テレビジョン用チューナ	33,471	54,402	40,000	64,500	45,000	68,000	119.5	118.6	112.5	105.4
56	▷水晶振動子	225,579	26,941	300,000	28,000	345,000	27,000	133.0	103.9	115.0	96.4
57	▷コネクタ	1,445,959	75,769	1,859,500	94,500	2,161,400	105,400	128.6	124.7	116.2	111.5
58	同軸コネクタ	8,081	3,644	9,500	4,500	11,400	5,400	117.6	123.5	120.0	120.0
59	その他のコネクタ	1,437,878	72,125	1,850,000	90,000	2,150,000	100,000	128.7	124.8	116.2	111.1
60	▷スイッチ(通信,電子装置用に限る)	806,089	69,342	916,000	80,000	1,030,000	88,000	113.6	115.4	112.4	110.0
61	▷プリント配線板*6	10,408	121,744	12,440	151,200	13,700	168,200	119.5	124.2	110.1	111.2
62	導体の層数が3以下のもの	10,178	107,638	12,150	131,500	13,350	145,500	119.4	122.2	109.9	110.6
63	民生機器用	9,281	60,123	11,000	72,500	12,000	78,000	118.5	120.6	109.1	107.6
64	産業機器用	897	47,515	1,150	59,000	1,350	67,500	128.2	124.2	117.4	114.4
65	導体の層数が4以上のもの	230	14,106	290	19,700	350	22,700	126.1	139.7	120.7	115.2
66	その他の一般部品	—	242,747	—	354,500	—	476,500	—	146.0	—	134.4
67	▷テレビジョン受信用アンテナ	8,189	17,797	6,760	14,800	6,700	14,000	82.5	83.2	99.1	94.6
68	▷磁気テープ*7	—	224,950	688,700	339,700	922,000	462,500	—	151.0	133.9	136.1
69	磁気録音テープ	—	—	300,000	130,000	342,000	150,000	—	—	114.0	115.4
70	磁気録画テープ	—	—	376,500	203,500	565,000	305,000	—	—	150.1	149.9
71	その他	—	—	12,200	6,200	15,000	7,500	—	—	123.0	121.0

72 (*1〜*8は次のページにあり)

Key:
1. FY 80 (actual record)
2. FY 81 (partially estimated)
3. FY 82 (projected)
4. FY 81/80 (%)
5. FY 82/81 (%)
6. Volume
7. Total value
8. Total electronic parts
9. General electronic parts
10. Parts for wire-communications equipment
11. Distribution box and terminal box
12. Plugs and jacks
13. Relays
14. Wire, spring relays
15. Other relays
16. Keys and exchanges
17. Passive parts
18. Resistors
19. Variable resistors
20. Carbon variable resistors
21. Wire-wound variable resistors

[Key continued on following page]

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22. Others
23. Fixed resistors
24. Carbon-skin fixed resistors
25. Carbon fixed resistors *2
26. Metal-skin fixed resistors
27. Wire-wound fixed resistors
28. Network resistors
29. Others
30. Condensers
31. Variable condensers
32. Fixed condensers *3
33. Paper condensers
34. Aluminum electrolytic condensers
35. Tantalum electrolytic condensers
36. Magnetic condensers
37. Organic film condensers
38. Others
39. Composite parts *5
40. Transformers (including wire rings)
41. Intermediate-frequency and high-frequency transformers
42. Input transformer (includes step transformer for transistors)
43. Output transformers
44. Power supply transformers
45. Others
46. Audio parts
47. Speakers
48. Less than 92 mm in diameter
49. More than 92 mm in diameter
50. Microphone
51. Stereo headphone
52. Pickup
53. Magnetic head
54. Constituent parts
55. Tuner for TV
56. Crystal oscillator
57. Connector
58. Coaxial connectors
59. Other connectors
60. Switches (limited to communication and electron equipment use)
61. Printed distribution panel *6
62. Less than 3 layers of conductors
63. For private-use equipment
64. For industrial use equipment
65. 4 or more layers of conductors
66. Other general parts
67. Receiving antenna for TV
68. Magnetic tape *7
69. Magnetic sound tape
70. Magnetic video tape
71. Others
72. See next page for *1-*8

Table 5 (b). Estimated Production of Electronic Parts*(2)
(Number Unit: 1,000 Pieces; Monetary Unit: 1 Million Yen)

		55年度(実績)		56年度(一部推定)		57年度(予測)		56/55年度(%)		57/56年度(%)	
		数量	金額	数量	金額	数量	金額	数量	金額	数量	金額
8	能動部品	—	1,303,014	—	1,560,070	—	1,757,210	—	119.7	—	112.6
9	●電子管	—	386,903	—	431,460	—	441,010	—	111.5	—	102.2
10	▷受信管	18	79	18	70	18	70	100.0	88.6	100.0	100.0
11	▷送信管	33	2,872	37	3,200	35	3,000	112.1	111.4	94.6	93.8
12	▷マイクロ波管	6,211	25,452	7,122	27,300	7,021	25,200	114.7	107.3	98.6	92.3
13	マグネトロン	6,189	21,183	7,100	23,000	7,000	21,000	114.7	108.6	98.6	91.3
14	その他	22	4,269	22	4,300	21	4,200	100.0	100.7	95.5	97.7
15	▷撮像管	18	308	14	290	12	240	77.8	94.2	85.7	82.8
16	▷陰極線管(ブラウン管)	29,288	294,286	33,540	329,000	33,800	332,500	114.5	111.8	100.8	101.1
17	テレビジョン用	27,767	287,085	31,000	315,300	30,600	314,500	111.6	109.8	98.7	99.7
18	白黒テレビジョン用	6,526	16,074	7,200	17,800	6,800	17,000	110.3	110.7	94.4	95.5
19	カラーテレビジョン用	21,241	271,011	23,800	297,500	23,800	297,500	112.0	109.8	100.0	100.0
20	工業用	1,521	7,201	2,540	13,700	3,200	18,000	167.0	190.3	126.0	131.4
21	▷表示管	50,061	26,106	47,000	24,500	52,000	26,000	93.9	93.8	110.6	106.1
22	▷放電管	83	1,407	120	1,900	130	1,900	144.6	135.0	108.3	100.0
23	▷X線管	53	5,640	50	5,900	45	6,000	94.3	104.6	90.0	101.7
24	▷その他の電子管	1,649	30,753	2,160	39,300	2,680	46,100	131.0	127.8	124.1	117.3
25	増倍管	1,264	23,233	1,840	32,500	2,400	39,600	145.6	139.9	130.4	121.8
26	その他	385	7,520	320	6,800	280	6,500	83.1	90.4	87.5	95.6
27	●半導体素子	—	311,123	—	395,910	—	447,200	—	127.3	—	113.0
28	▷ダイオード	6,976,756	46,258	9,435,000	62,910	11,109,500	70,800	135.2	136.0	117.7	112.5
29	ゲルマニウム・ダイオード	823,717	4,122	622,660	2,990	535,500	2,500	75.6	72.5	86.0	83.6
30	シリコン・ダイオード	6,153,039	42,136	8,812,340	59,920	10,574,000	68,300	143.2	142.2	120.0	114.0
31	▷整流素子(100 mA以上)	2,293,784	53,762	2,574,500	58,900	2,722,000	61,000	112.2	109.6	105.7	103.6
32	シリコン整流素子	2,273,664	50,740	2,553,000	55,900	2,700,000	58,000	112.3	110.2	105.8	103.8
33	その他	20,120	3,022	21,500	3,000	22,000	3,000	106.9	99.3	102.3	100.0
34	▷トランジスタ	6,126,312	122,294	9,417,800	165,600	11,296,000	189,900	153.7	135.4	119.9	114.7
35	ゲルマニウム・トランジスタ	75,544	2,499	37,800	1,600	26,000	1,200	50.0	64.0	68.8	75.0
36	シリコン・トランジスタ	5,870,546	113,617	9,100,000	155,000	10,920,000	178,000	155.0	136.4	120.0	114.8
37	電界効果トランジスタ	180,222	6,178	280,000	9,000	350,000	10,700	155.4	145.7	125.0	118.9
38	▷サーミスタ	128,862	5,207	138,000	6,000	146,000	6,500	107.1	115.2	105.8	108.3
39	▷バリスタ	311,027	4,673	350,000	8,000	385,000	10,000	112.5	171.2	110.0	125.0
40	▷サイリスタ	143,705	21,167	168,000	21,000	180,000	21,000	116.9	99.2	107.1	100.0
41	▷光電変換素子	1,467,157	50,546	1,951,400	66,070	2,400,000	80,000	133.0	130.7	123.0	121.1
42	光電ダイオード	1,351,187	36,227	1,800,000	47,500	2,200,000	56,000	132.9	131.1	122.2	117.9
43	その他	112,970	14,319	151,400	18,570	200,000	24,000	134.0	129.7	132.1	129.2
44	▷その他の半導体素子	161,136	7,216	118,000	7,430	100,000	8,000	73.9	103.0	84.7	107.7

[Table continued on following page]

Key:

1. FY 80 (actual record)
2. FY 81 (partially estimated)
3. FY 82 (predicted)
4. FY 81/80 (%)
5. FY 82/81 (%)
6. Volume
7. Monetary value
8. Active parts
9. Electron tubes
10. Receiving tubes
11. Transmission tubes
12. Microwave tubes
13. Magnetron
14. Others
15. Rectifying tubes
16. Anode ray tubes (Braun tubes)
17. For TV use
18. For black-and-white TV
19. For color TV
20. For industrial use
21. Display tubes
22. Discharge tubes
23. X-ray tubes
24. Other electron tubes
25. Picture tubes
26. Others
27. Semiconductor elements
28. Diodes
29. Germanium diodes
30. Silicon diodes
31. Rectifying element (more than 100 mA)
32. Silicon rectifying element
33. Others
34. Transistors

[Key continued on following page]

35. Germanium transistors
36. Silicon transistors
37. Electric field effect transistors
38. Thermister
39. Varistor
40. Thyristor
41. Photoelectric conversion element
42. Light-emitting diode
43. Others
44. Other semiconductor elements
45. Integrated circuits
46. Semiconductor integrated circuits
47. Analog IC
48. Digital IC
49. Bipolar type
50. MOS type
51. Mixed integrated circuits
52. Thin film integrated circuits
53. Thick film integrated circuits
54. Liquid-crystal elements*8

55. *1 The basic figures for parts classification and production records were from the MITI Machine Statistics (monthly report). Each FY ends in March. (For example, FY 82 runs April 1982 through March 1983)
56. *2 Includes metal oxide skin type fixed resister
57. *3 Includes metallized paper condensers
58. *4 Includes metal-organic film condensers
59. *5 Composite parts of combinations of resistors, condensers, and coils. Does not include working parts such as transistors and IC
60. *6 The volume unit of printed distribution plates is 1,000 m^2
61. *7 Volume unit for magnetic tape is 1,000 m^2. For example, 1 cassette of sound tape "C-60" is 0.343 m^2. "T-120" video tape (VTR tape) of VHS-type 120-minute use is 3.112 m, and β type "L-150" is 1.898 m^2
62. *8 FY records for liquid crystals are limited to statistics for January-March 1981

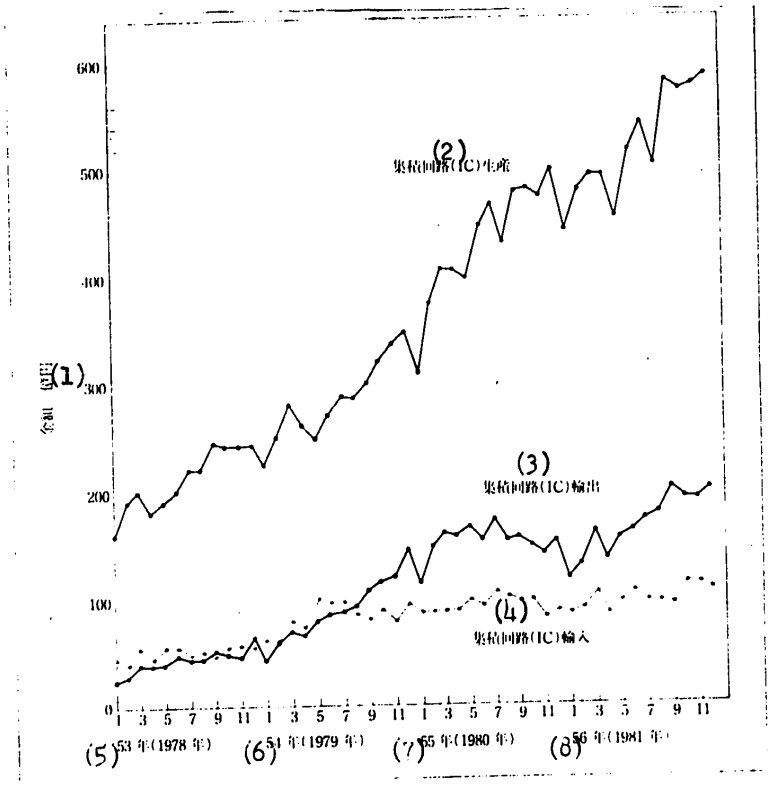

Figure 4. IC (Integrated Circuit) Production Trends and Export-Import Trends

Production values from MITI Machine Statistics (monthly report), Export-import values from Ministry of Treasury Customs Data; Both exclude hybrid integrated circuits.

Key:

1. Monetary value (100 million yen)
2. Integrated circuit (IC) production
3. Integrated circuit (IC) exports
4. Integrated circuit (IC) imports
5. 78 (1978)
6. 79 (1979)
7. 80 (1980)
8. 81 (1981)

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